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More Grain for Your Dairy Cows ..... *Agricultural Situation* 1
Hay-Driers Make Top Quality Hay ..... *The Southern Planter* 6
How to Protect Your Electric Motor ..... *American Agriculturist* 9
Building and Preserving Udders ..... *Guernsey Breeders Journal* 11
This is China: Portrait of a Nation ..... *New York Times Magazine* 17
Chemicals Recharge Useless Desert Soils ..... *Christian Science Monitor* 24
How to Cool a House ..... *Capper's Farmer* 26
Let's Use Fertilizers Wisely ..... *Iowa Farm Science* 29
Seeding from the Sky ..... *Western Farm Life* 32
Factors in Fattening Steers ..... *Michigan Farmer* 35
Streamlining Poultry Breeding ..... *Everybody's Poultry Magazine* 38
Sweet Potato Bushes ..... *Farm Journal & Farmer's Wife* 43
Hogs a Bigger Market for Forage ..... *Successful Farming* 45
How Handy Can a Farmstead Be? ..... *Missouri Ruralist* 49
Strip Cropping Made Easy ..... *Soil Conservation* 52
Barn Cleaners Minimize Drudgery .... *Northwest Farm Equipment Journal* 55
Reduce Silage Losses ..... *Ohio Farm and Home Research* 59
Management of Grasslands ..... *Kentucky Farmer* 62
Test Your Own Sows ..... *Breeders Gazette* 65
Hamsters—A New Industry ..... *Better Farms* 68
Geese Are Profitable ..... *American Poultry Journal* 71
Potatoes: Yesterday and Today ..... *Rural New Yorker* 75
Methods of Applying Fertilizer ..... *Fertilizer Review* 80
Storing Orchard Chemicals ..... *American Fruit Grower* 87
Permanent Pastures in South Carolina .... *Better Crops with Plant Food* 91
Specialized Farming ..... *The Farmer* 93
Index 95
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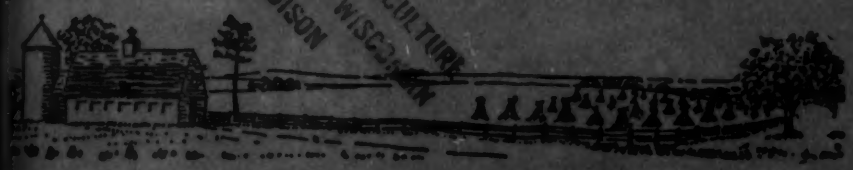

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More Grain for Your Dairy Cows?

Condensed from the Agricultural Situation

John W. Klein and Ralph D. Jennings

Bureau of Agricultural Economics U.S.D.A.

MADISON, WISCONSIN

Reprinted from The Agricultural Situation
Washington, D. C. February 1949

WHETHER it will pay to feed more grain to dairy cows is a question each dairy farmer must figure out for himself. But the results of feeding experiments that the Department of Agriculture made in cooperation with 10 State Agricultural Experiment Stations will help him in his calculations.

Whether it will pay to feed more grain to dairy cows depends on the prices of grain, hay, and milk. While it is generally recommended that farmers feed plenty of good hay and other roughage, heavier feeding of grain to cows is likely to be profitable on many dairy farms the next year or so because there is a continued strong demand for milk; larger supplies of feed grains are available, and feed prices are low in relation to milk prices.

As more grain is fed, in general, less and less milk is produced per pound of grain. Even so, if grain is cheap compared with milk it may pay to feed grain heavily.

The quality and quantity of roughage available for feeding is very important in determining the amount of grain to be fed. Cows will consume more good-quality roughage than roughage of poor quality and will get more nutritive value out of each pound. Also, when farmers have a lot of roughage available per cow and little opportunity for using it for other purposes they prefer to feed more per cow than when the amount of roughage is limited and its price is high.

Methods of feeding roughage and the amount fed per cow vary considerably. In the following, the results of only two feeding experiments are presented. In the first, cows were fed all the good

quality roughages they would eat. In the second, good quality roughage was limited to 18.5 pounds of hay or its equivalent per 1,000 pounds liveweight daily. The most profitable rate of grain feeding is considerably different in the two situations. A dairyman should decide whether either situation fits his conditions before using the information in this article.

The figures that follow apply to good dairy cows, like those in dairy herd improvement associations, giving 6,000 pounds of milk a year, or more.

Cows with free access to good roughage: Generally, if cows are allowed to have as much good hay or other roughage as they want and then the grain ration is increased they eat more grain but eat less hay and other roughage. The figures show that for each additional 100 pounds of grain fed 60 to 75 pounds less hay is consumed.

Total milk production is increased but as you feed more grain you get less and less milk per additional pound of grain. This is partly due to the fact that this grain replaces some roughage but it is also true that with heavier feeding cows make less efficient use of the nutrients in their feed.

For instance, cows fed 1 pound of grain for each 6 pounds of milk will produce 97 pounds more milk for each additional 100 pounds of grain. Cows fed heavier than one to six the year around will produce less milk per 100 pounds of additional grain as shown below.

Level of feeding grain	*Pounds milk from 100 more grain*
1: 6	97
1: 4	77
1: 3	59
1: 2½	45
1: 2	31

This information could be used to figure out whether it will be profitable for a dairyman to feed additional grain to his cows. Let's assume that he has a herd of medium size cows testing 4 percent butterfat and that he is feeding his herd the year around about 1 pound of grain to 3 pounds of milk; and that the price of milk is $4.25 per hundred pounds. Grain is $3 per hundred pounds and hay is $25 per ton.

He would first calculate the value of the additional milk by multiplying the pounds of additional milk (59 pounds in this case) by the current farm price for milk. He would figure on 68 pounds of hay or about one-thirtieth of a ton saved for each additional 100 pounds of grain fed. His calculation:

Value of 59 pounds additional milk at $4.25 per hundred pounds	$2.51
Value of hay saved (68 lbs. at $25 per ton)	.83
Total Credits	3.34
Cost of 100 pounds grain fed	3.00
Return per $1 of additional grain fed ($3.34 divided by $3.00)	1.11

So in this instance, it would pay to feed more grain. Any return higher than $1 per $1 of grain fed is usually profitable, because any extra labor or other costs are too small to count.

How much more grain would it pay to feed? The general rule is that increasing grain feeding will pay up to the point where the cost of the last increase in the grain ration just equals the value of the additional milk produced. Figuring this "break-even point" in grain feeding for cows of different size and butterfat test is easy by using table 1. Most profitable levels of feeding shown in this table were figured by the method just described.

In using the table, first find the pounds of milk it takes to pay for 100 pounds of grain. If grain is $3.00 a hundred pounds and milk is $4.25 a hundred or 4¼ cents a pound, it takes 71 pounds of milk to pay for 100 pounds of grain. Go down the first column of table 1 until you come to 70 then across to the column that fits your conditions. For example, if hay is worth $25 a ton (6 times the price of milk per hundred pounds) and your cow is medium sized, testing about 4 percent butterfat, then column 6 is the one to use. In that column you find 2.7 opposite 70 in the first column. Therefore the most profitable rate of feeding is 1 pound of grain to about 2.7 pounds of milk. But if hay is cheap and abundant 1 pound of grain to 3.1 pounds of milk would be the answer (column 3). If it is a large cow, testing 3½ percent butterfat, it would be 1 to 2.8 (column 5), or 1 to 3.2 (column 2), depending on the price of hay.

Cows fed limited quantities of good roughage: But what if you do not have enough roughage to give the cows all they will eat as is the case on many farms? Suppose you give them about 18.5 pounds of good hay a day per 1,000 pounds liveweight (20 pounds of average hay), or the equivalent in other roughage. (Figure that 3 pounds of silage are equal to 1 pound of hay.)

If you feed additional grain, your cows will eat about the same amount of hay or other roughage as before, so you will not save in hay and no saving will appear in the calculation. But you will get more milk from 100 pounds of

additional grain than if the cows had all the hay they would eat because the cows are not getting as much feed in total and also because they do not reduce their hay consumption when the grain ration is increased.

From table 2 you can determine the additional milk that you can expect from each 100 pounds of additional grain fed. If you are feeding your herd (assuming medium-size cows) at the 1 to 2.5 level and add 100 pounds of grain you may expect 85 pounds of additional milk (first column, table 2). This compares with only 45 pounds when cows have all the roughage they can eat.

What is the most profitable level of feeding cows where the feeding of roughage is limited? This also is shown in table 2. Assume that milk sells for $4.25 a hundred, or 4¼ cents a pound, and grain is worth $3 a hundred pounds. Then 100 pounds of grain will equal in value 71 pounds of milk (3 ÷ .0425 = 71). Running down the first column in table 2 to 70 (the nearest figure to 71) and reading across you will find three different rates of grain feeding given. If your cows are medium sized testing 4 percent butterfat, for example, your most profitable level of feeding would be 1 pound of grain to 2.3 pounds of milk.

Now let us see if feeding your medium-size cows at the one to two level would be less profitable, assuming the same prices. You only obtain 55 pounds of additional milk from 100 pounds of additional grain when feeding at the one to two level. (See footnote, table 2.)

Value of 55 pounds of additional milk at $4.25 ..	$2.34
Cost of 100 pounds of additional grain at $3 ...	3.00
Hay saved (none)	....
Loss on each 100 pounds additional gain	.66

In this case, it is not as profitable to feed cows 1 to 2 as 1 to 2.3 because money was lost on the last few pounds of grain fed.

In the experiments that provided the figures used in this article the cows were barn fed throughout the lactation period, but the figures will apply to pasture feeding as well. The results shown for good cows that have access to unlimited roughage (table 1) probably would apply when feeding grain to cows on pasture if the pastures are good to excellent. The results shown in table 2 probably would apply if the pasture is only fair.

If the pasture is poor, then 100 pounds of additional grain probably would increase milk production more than is shown in table 2. Farmers usually cut down their rate of feeding grain to dairy cows during the summer

when the cows are on pasture. It probably would pay to feed grain heavily right through the 1949 pasture season.

TABLE 1.—*Most Profitable Rate of Grain Feeding*[1]

Pounds of milk equal in value to 100 pounds of grain or mixed feed	Feeding one pound of grain to the pounds of milk given below					
	Hay price per ton 3 to 4 times milk price per 100 pounds			Hay price per ton 5 to 7 times milk price per 100 pounds		
	Large cows testing 3½% fat	Medium cows testing 4% fat	Small cows testing 5% fat	Large cows testing 3½% fat	Medium cows testing 4% fat	Small cows testing 5% fat
(1)	(2)	(3)	(4)	(5)	(6)	(7)
120	7.7	8.2	8.5	6.3	6.5	6.6
110	6.1	6.2	6.3	5.2	5.2	5.2
100	5.0	5.0	5.0	4.4	4.3	4.2
90	4.2	4.1	4.1	3.7	3.6	3.4
80	3.7	3.5	3.4	3.3	3.1	2.8
70	3.2	3.1	2.8	2.0	2.7	2.4
60	2.8	2.6	2.4	2.4	2.3	2.1
50	2.4	2.3	2.1	2.1	2.0	(2)
40	2.0	(2)	(2)	(2)	(2)	(2)

[1] For cows of different size and butterfat test getting all the good hay or its equivalent in other roughage they will eat with different relative prices of grain and hay to milk.
[2] All they will eat without injury.

TABLE 2.—*Most Profitable Level of Grain Feeding*[1]

Pounds of milk equal in value to 100 pounds of grain or mixed feed[2]	Feeding one pound of grain to the pounds of milk given below		
	For large cows testing 3½% fat	For medium cows testing 4% fat	For small cows testing 5% fat
	Pounds	*Pounds*	*Pounds*
175	4.1	4.0	3.9
160	3.7	3.5	3.4
145	3.4	3.2	3.1
130	3.2	3.0	2.8
115	3.0	2.8	2.6
100	2.9	2.7	2.4
85	2.7	2.5	2.2
70	2.4	2.3	2.1
55	2.1	2.0	(3)

[1] For cows of different size and butterfat test where roughage is limited to 18.5 pounds of good hay or its equivalent per 1,000 pound cow daily with different relative price of grain to milk.
[2] The figures in this column are also the pounds of additional milk obtained from feeding 100 pounds additional grain at the specified rates of feeding.
[3] All they will eat without injury.

Hay-Driers Make Top Quality Hay

Condensed from The Southern Planter

J. E. Collins

Virginia Polytechnic Institute

HAY-DRIERS are a "must" for the 497 farmers who operated driers in Virginia last year. They are producing and curing top quality hay at reasonable cost. They know that hay-driers virtually eliminate the weather hazards in haymaking.

"We are particularly pleased with the improved quality of the alfalfa hay resulting from the use of our new hay driers," says H. M. Woodward, acting farm manager and treasurer of Woodberry Forest School, in Madison County. "Bright, leafy and high in T. D. N., it is greatly superior to the baled hay we were previously using. I feel safe in saying that our drier will pay for itself in two seasons because of the real 'milk-maker' hay it enables us to give the school herd. Further, we are experiencing better results in our haying operations. During doubtful or changeable weather, we find that drying *halves* the hay making period."

Professor C. W. Holdaway, head of the V. P. I. Dairy Department at Blacksburg, praises the 4 hay-driers they are using on the V. P. I. dairy farm. Professor Holdaway puts it this way:

"We have used hay driers at the Dairy Husbandry barns continuously since 1940. Our crop at that time consisted of about 100 to 150 tons of hay. Since then the hay crop has increased to over 300 tons annually.

"At Blacksburg, during the haying season, the weather is showery and uncertain. If the weather is clear at times, it invariably is accompanied by heavy dews at night which do not dry off until noon or later. Under these circumstances practically no hay can be classed strictly as No. 1 and frequently the final result is a low No. 2 or No. 3. Sometimes the rain keeps the cut hay so wet that it spoils entirely before it can be harvested.

"We now have 4 barn hay-driers and use them to dry baled as well as long hay. In addition to being able to harvest and cure a good grade of hay in almost any climate, barn drying can be made the basis of an all-weather

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system of curing grasses and forage for winter feeding. As soon as the hay is at the proper stage for cutting, the work can proceed almost without regard for the weather. In the morning when the grass is still wet it can be cut and blown into the silo. Later in the day when the hay dries off it can be put on the drier. *Then if the weather is exceptionally good for hay curing,* it may be dry enough to go into the hay mow or be baled in the field without being put on the drier.

"Altogether, in this climate and probably in places where even better climatic conditions prevail, it can be said that a hay-drying outfit will pay for its total cost the first year or two in better quality hay, reduction in spoilage, and better use of labor, teams and machinery."

According to the revised 1948 Handbook of Official Hay and Straw Standards, published by the USDA-PMA, Grain Branch, U. S. No. 1 alfalfa hay must meet the following standards: (1) 40 per cent leafiness—minimum per cent of leaves, (2) 60 per cent color—minimum per cent of green color, and (3) 5 per cent—maximum per cent of foreign material.

Hay which contains more leaves and green color than is indicated above is designated as leafy, extra leafy, green and extra green, depending on the percentages. For example, alfalfa hay that contains 50 per cent or more leaves and 75 per cent or more green color and not more than 5 per cent foreign material is designated as U. S. No. 1 extra leafy, extra green alfalfa hay. This is top quality hay.

Weather hazards in hay making are considered the most universal cause for losses in hay quality at hay curing time. Virginia usually has excellent weather for growing top quality hay. This same weather also prevails at harvest time. Heavy dews and frequent light showers make field curing of No. 1 hay almost impossible. Every farmer knows how fast a hay crop can go to waste if it is caught in a light shower after it has been cured in the field and is ready to be stored. The color is bleached out and the leaves are shattered, and all that is left are stems which have a low feed value.

Many farmers experience these losses year after year while other farmers install hay driers and do not have to worry too much about the weather at hay harvest time.

The slatted floor duct system that was developed by agricultural engineers of V. P. I. in 1945 has been used almost universally since it was introduced. This system distributes the air evenly under the hay. It is relatively easy

to construct, and rough lumber can be used to build it. These advantages lower construction costs. The system has proved satisfactory in every way and no changes in design are being recommended, as it is the best system available at this time.

The propeller type fan has been used on practically all hay-drier installations made in Virginia since 1945. This type fan has operating characteristics which make it very satisfactory for use in hay drier systems. When high pressures are encountered, the backward curved centrifugal fan is recommended.

In some instances artificial heat is desirable. By using artificial heat the drying time can be reduced. It also makes it possible to dry hay while it is raining and to have a continuous drying operation regardless of the weather.

The cost of hay-drier equipment when using artificial heat is about double that of the conventional hay-drier equipment. The cost for fuel and electricity to dry a ton of hay using artificial heat may be slightly more than when using the regular fan and motor type drier units.

Portable heating units are available, and with properly designed storage facilities, they can be used to dry other crops such as small grains and corn, both in the ear and shelled. Where artificial heat is used it presents a fire hazard (reduced to a minimum) and will require more attention than the conventional type dried units.

The average cost for electricity to dry a ton of hay varies from 75 cents to $1.50 per ton based on average rates. The amount of electricity required will depend upon the type of hay to be dried, its moisture content when placed on the drier, and the outside weather conditions. Considering the benefits obtained, this is a small amount to pay.

The cost of installing a hay drier will be approximately 45 to 50 cents per square foot of mow area. This estimate includes equipment, lumber and labor. The cost of electric wiring to the motor is not included in this estimate.

How to Protect Your Electric Motor

Condensed from American Agriculturist

Paul R. Hoff

ELECTRIC motors require little attention. For that reason they often do not receive the small amount of maintenance that is necessary to keep them operating almost indefinitely. Continuous overloading, poor lubrication, improper electrical circuit protection, operating in dusty or wet surroundings and low line voltage are the most common causes of an electric motor burning out. A motor will burn out quickly when it becomes sufficiently overheated but it usually gives warning of trouble ahead of time by smoking or by giving off a characteristic odor. It cannot protect itself by stalling as does a gasoline engine.

Motors with ball bearings usually have a supply of grease sealed into the bearings for the life of the motor. This removes the need for periodic lubrication. All motors with sleeve bearings require lubrication at intervals. These motors must be lubricated according to the manufacturer's instructions. Motor bearings must have the right amount of oil. Too much is almost as bad as too little because the excess oil runs out and soaks into the insulation, causing it to break down. Also, the oil may dry and form gum on the motor parts, interfering with their operation.

A motor must never be mounted in a position that makes it possible for oil to run out of the bearings. Most motors are built to operate in a horizontal position. Unless the end plates can be changed to keep the oil reservoirs horizontal, they should not be hung on a vertical wall. Unless a motor is especially built for the position, it should not be mounted on end.

Most electric motors circulate air through the interior for cooling while they are running. If the openings in the end plates and the air passages around the coils become clogged with dust or chaff, the air circulation is decreased. This may cause overheating and eventual loss of the motor. Dirt that gets into the motor may also work into the bearings and cause rapid wear or it may interfere with the starting mechanism.

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Ithaca, New York, February 5, 1949

Occasional cleaning prevents these troubles. The steps are: After the motor is disconnected from the electric circuit and removed from its load, remove the end plates and pull the rotating part (armature) from the frame. Then dry-clean each motor part with rags or a dry paint brush. It may be necessary to wash the metal parts with cleaning fluid. If cleaning fluid must be used on the coils to remove oil or grease, use it sparingly, because there is danger of damage to the insulation. Also, make sure that the air passages through the armature and the ends of the motor are cleared of dirt.

Before the motor is reassembled, look over the starting mechanism for worn or broken parts. Broken or badly worn parts may require the services of a motor expert for replacement. Finally, reassemble the motor, putting the parts back exactly as they were before the motor was taken down. Tighten the end plate nuts a little at a time until they are all tightened evenly. Make sure that the shaft turns freely after the end plate nuts are tight and before the motor is connected to the electrical circuit.

Damage from overheating, regardless of the cause, can be prevented by connecting one of the various types of thermal cutout devices into the motor circuit. Some motors have thermal cutouts built into them.

The two types of thermal cutout devices are delayed action fuses and thermal cutouts. The delayed action fuses must be replaced each time they cut out, but the thermal cutouts can be reset. The capacity of each (rated in amperes) must be correct for the motor with which it is used. There should be no other electrical appliance in the circuit between the protective device and the motor.

Low voltage caused by undersized wires is a common cause of unsatisfactory motor operation. With thermal cutout protection, the motor is protected from damage but its service is likely to be interrupted frequently. Without this protection, damage from low voltage is always possible. Along with thermal cutout protection, adequate wiring of all electric service including motor circuits insures satisfactory operation of all electrical equipment.

Building and Preserving Udders

Condensed from the Guernsey Breeders Journal

C. R. Huston
Manager of Franchester Farm, Lyndhurst, Ohio

THERE were nine two-year-old heifers all lined up in a row, and not one of them had a good udder. That was the story in a stiff, tri-county Ohio show. Three had soggy thickened quarters, one a bad side leak, two had unsightly supernumeraries, and not one had a good, sound fore attachment.

Prof. Ely says, "Cow profits depend more on the udder than on any other single organ." Therefore, the building and protecting of that udder seems to me to be one of the breeder's big jobs. This task begins with what inheritance gives us, and continues through the active life of the cow. When a calf is born, everyone takes a squint to see whether it is a heifer or a bull. If it is a heifer, I wonder how many people really look closely enough to see the number of teats and how they are placed. You say, "Well, you can't tell anything even if you do look",—and that is partly true, but after you look for a while you get some ideas and they are healthy to have.

As the calf starts to grow and develop, we need to watch the tiny glands for any enlargement or swelling. Calves sucking each other can cause trouble in a hurry. I once saw an owner become so enraged at finding a couple of his best heifers sucking each other that he hopped over into their pen, grabbed one and started pounding her nose. He recovered himself in a minute and told me how angry it made him to find calves nursing each other, and how likely it was to cause trouble. We continued the inspection of his cattle and no further action was taken, at that time, to segregate the suckers. No use of force will break calves of sucking. To do that, the calf either has to be isolated, muzzled, or a ring put into her nose. So many people rave about the sins of suckers, but do nothing specific about it.

A few years ago we had a two-month-old heifer show up with an enlarged quarter. On examination, infection was discovered, and everything possible was done to save the quarter, but it eventually came in blind. This

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calf had probably been sucked, but had she been under closer observation, and the trouble discovered earlier, the quarter might have been saved.

K. C. Sly makes his check on the udders of youngsters by running his hand down the rear attachment, between the hind legs, and gently feeling each gland. Others prefer to take a look underneath and follow that with a check on each gland. Making a practice of such examinations on heifers soon gives the checker an "all is well or not" feeling the moment he touches the heifers' udders. After using such a system for a number of years, it was surprising to me to watch a state fair judge place his classes of heifers without once looking or checking them underneath, observing only what could be seen from the rear.

From calf pen to the bred heifer barn, the heifer needs less udder attention than at any other time in her life, and yet it is during this period that a lot of people completely neglect checking the heifers' udders, and are stunned by what they have after the udder gets into production. It is during this period that the observer who has been studying his heifers, and knows the female families and their inheritance, can get indications as to the shape an udder may take.

The average breeding establishment can properly care for, feed, house and develop only a certain number of heifers each year, and those heifers that cannot possibly have good udders, whether from a shape or fore attachment standpoint, should be culled out and the effort, time and feed put on the more promising ones.

An indication that can be arrived at early is the placement of teats on the udder. If the teats are lined up from rear to front, as they should be, that is one thing, but if the front ones are very wide apart, with some tendency to strut out from the udder, and the rear ones are close together, then you can bet that this teat placement is what you will have when the udder is completed. We used one bull that gave us a high level of production, but placed on each of his daughters varying degrees of this kind of a teat placement. On the daughters out of dams with poor teat placements, the fore teats were very wide apart with the quarters bulging away from the body, and the rear teats were right together even though the udder was filled with milk. This kind of placement looks so bad from underneath, looking up, that one gets a feeling that the four teats are almost in a row from left to right.

We are three generations away from some of these original cows,

and even when bulls with a strong inheritance for the right kind of teat placement are used, the placements are not yet what they should be.

By this time, in a heifer's life, all of the side leaks, fistulas, double teats and super-numeraries should have been corrected. While super-numeraries can be removed by putting rubber bands around them, it is best to call in your veterinarian on all corrective work. It is during this period that heifers have to be closely watched for filling quarters. Last year, in one of our shows, an outstanding senior yearling heifer was shown with her rear quarters so filled and distended that she looked as if she might be going to have a two-story udder. It was impossible to get any kind of a picture as to what her udder might look like when she freshened. Upon checking with the owner of the heifer, he admitted that he was disturbed by the situation, but did not know what to do. Following a suggestion that she be stripped out, he sat down and took out of each rear quarter more than a pint of syrupy, milky liquid. The udder looked better after this, but the two rear glands were considerably pulled out of shape and it looked as if the udder might come in at freshening time with rear quarters being quite pouchy and out of shape.

With a definite plan in mind, of keeping the heifer milked out and attempting to dry her up, as you would a milking cow, there was hope that the udder might hold some of its shape. Three weeks later this heifer again appeared in the show ring, looking much nicer, with some of the pouchiness in her rear quarters gone. Perhaps a number of oddly shaped udders and those particularly with low hung, *flabby quarters,* might have had a history of *being pulled out of shape* before they freshened as two-year-olds.

Any distension or swelling in a heifer's udder is cause enough to bring her in and make a thorough examination. During fly time and the intense summer heat, quarters may start to fill and they should be kept stripped out. Last summer a bred heifer showed up with considerable swelling in her rear udder. The rear teats and the canals did not seem to be involved, but the swelling continued to go from bad to worse, poulticing, hot water treatments, sulfanilimide and penicillin, did not seem to help things. The focal point of the trouble gradually centered in an area about two inches back of the rear teats. An incision was made into what seemed to be the center of the area. Great quantities of pus were discharged, and after about a month and a half of treatments the udder returned

to almost normal shape. The heifer has now been in production about three months, and it takes a keen eye to find where the trouble was centered.

With the approach of the freshening date, the heifers' udders gradually continue to increase in size, sometimes evenly and sometimes not. During this period, it is the job of the attendant to keep a sharp watch for any unnatural condition. More and more time must be spent with the heifer, accustoming her to being handled, and massaging her udder. While there is a great deal of conjecture as to how much good massaging does, it still seems to be good practice and it does much to relieve the animal. As the swelling and edema continue, and the calving time approaches, we reach one of the most critical periods in a heifer's life, from the standpoint of supports for her udder. Heifers that really want to milk usually fever heavily, involving the whole underline almost to the brisket. The misery, due to the congestion and swelling, causes her to spend a great deal of time on her feet and keeps her milling around the stall. The distended condition of the udder and the misery of the animal is bound to bring forth the question of "should she be milked before the freshens, or not." This point brings to mind a heifer I saw two or three years ago. She was just ready to calve and had a very promising but badly swollen and distended udder. I asked her owner if he had been stripping her out any to keep down this intense swelling. He stated that he had not, but probably should have done so. I did not see the heifer again for better than a month, and when I did I really was shocked. Her udder had loosened in both fore and rear attachment, and in the owner's own words, he said, "her bag had just dropped off her." He stated that there was no sign of infection, but the udder just seemed to get too big for the heifer, and the results were so bad that he was sending her to the butcher.

For a number of years we have been stripping out our heifers four or five times a day, as soon as the congestion in an udder reaches a point where the animal shows signs of much distress, the thought behind this being to avoid over-distention of the glands which might tend to weaken their support with the wall of the abdomen.

In our herd, a study of udders before and after they have made 800 lbs. of fat or more, leads one to wonder how long and how high one can expect a cow to produce and still keep enough resistance in reserve to fight off infection in the mammary system.

The idea of "loafing" *good*

cows has been condemned from many quarters, and perhaps it should be, but when you get a cow that has the equipment, desire and stamina to make 800 lbs. of fat or more, how long should you expect her to continue at that speed? A mule will not do more than he feels he should. A man, if he is a good one, will try it for a while, but a cow, if she has the stuff in her, will milk and milk even at the expense of her own body and system. Realizing this, should we not guard the health and udders of our good cows with more thought and planning?

A few years ago I visited a herd that had received much national recognition for having a very high production level. I was much disappointed to find that every cow in the herd had a broken fore udder. We all want high production, but is it necessary that high production and broken udders should go together?

Breeders should constantly be on the watch for ways and means of preserving udders. An outstanding cow loses grace by leaps and bounds as soon as her fore udder breaks. The visitor shakes his head and sighs, "It's too bad, isn't it, she was such a good cow." And if you, in error, should suggest his being interested in her son, based on what she used to be, he will give you a look that browns the grass beside you.

Recently, Harry Hays of Toronto, Ontario, Canada, made the statement that he had considerable success in keeping udders on his good Holsteins by not drying them up between lactations. In other words, he loafed his cows through the last two months or so of their lactations, but did not dry them up entirely. Consequently, at freshening time, there was less fever and congestion, all of which contributed much to keeping their udders tightly buckled to the underline. We have not tried this method, suggested by Mr. Hays, but there seems to be a great deal of common sense in it, particularly when you think that most breaks show up in udders shortly after the cow calves.

The hornless Guernsey, which is creating so much comment at this time, should contribute to the preservation of udders. Injuries often lead to mastitis, and a case of that has never yet improved a fore attachment or helped improve the shape of an udder. An owner with an excellent uddered cow in his herd of horned animals, even though horns have been tipped and the mean cows segregated, never can be positive as to how long that udder will escape injury. Any bruise received on an udder generally leads to scar tissue or thickness in a quarter. Protecting an udder

from injury is a continuous job. John Hansen, an old-timer in the Guernsey business, suggests that the injury inflicted by the poll of a dehorned cow may involve more area of an udder than a poke with a horn. This is something for the hornless advocates to think about. Other factors than injury predisposed to mastitis are overfeeding, wet, cold stalls, and drafts. A "warm floor" under the cows hind feet keeps the udder from being chilled when the cow is resting and a warm udder has good circulation and is not a place for bacteria to get a foothold.

Much has been written and much said about the way to dry off a cow. Some say, "Stop milking her and forget about her," others, "Cut feed and water intake, put the cow in a box stall and milk her out after four or five days." Others contend, "dry her up slowly and on a planned schedule." Perhaps each plan has merit, but the thing to remember is that the more milk and fat a cow produces, the greater the load on her body and the more important it becomes for her to be kept in good physical condition.

The attachment of a cow's udder seems to be one of the first places to reflect her condition, and an attachment that lets go never will be the same again. Most changes in the support of an udder occur shortly after freshening, so one is led to believe that drying up of the cow might have played some part in the trouble. A mastitis test and a physical examination of an udder before drying off starts, might help much in giving us a cue as to what system should be used in drying off the cow and what to expect at the next freshening.

The building and preserving of udders is one of positive action. Now is the time, not tomorrow, to separate those calves you caught nursing each other.Now is the time to strip out that heifer with the filled quarters, or remove that side leak or those extra teats. Now is the time to relieve the tension on that two-year-old's udder, that is causing her untold misery. Now is the time to test and check the udder on that good old cow that you plan to dry up. Now is the time to see that the cow making over 800 lbs. of fat gets some extra good green feed or green hay so that when she freshens next time her udder may be just as good as ever.

An ounce of prevention is worth many pounds of cure, for once an udder is broken or diseased it will never again be the same.

This is China: Portrait of a Nation

Condensed from the New York Times Magazine

Gerald F. Winfield
Agricultural Scientist, formerly on the faculty at Cheeloo University, Tsinan, China
Author of "China: the Land and the People"

THIS is a picture of China—the China which has now become a focal point in the world struggle—a vast problem that calls for close study, especially by Americans, for we are deeply concerned with the present and the future of the country.

China is a vastly varied segment of the world only moderately endowed with natural resources. She is a mass of people ancient in origin, able but impoverished; a culture old and successful, but beset from without and within; an economy agricultural at root and still largely confined to hand methods of production. She is a political entity bursting from the confines of a system of government that has existed for 3,500 years. She is the spearhead of two-thirds of the human race that live on or near the survival line. She is our next-door neighbor in the air age.

China is a country that has been rocked by war and revolution for the last half-century. For twelve consecutive years large-scale battles have bloodied her soil. The blackened ruins of burned-out villages dot the plains of Manchuria and North China. Along the Yangtze and deep into the south and west the scars of Japanese bombing and invasion are still evident in city and countryside.

Millions of refugees from shelling, machine-gun and rifle fire, the surge of battle and the fear of what Communist rule may mean sleep beside the road, in strange villages, in the doorways of city buildings or in the mat sheds of hastily organized refugee camps, scores or hundreds of miles from their homes. The news from China fairly boils as events move toward a far-reaching shift in power. Yet underneath the trauma and violence of war venerable China remains long-suffering and indestructible.

China is the dusty Shantung plain in springtime—a green and brown patchwork of diminutive fields stretching as far as the eye can see, broken only by clumps of new-leafed trees clustered in scattered villages. China is the thousands of half-naked Shantung farmers bobbing over hand

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windlasses, drawing water to irrigate their garden-crop wheat. China is the long roads through the Shansi loess, rutted and sunken by the passing of countless carts through the endless years.

China is the pungency of the Tsingtao fish quay, where seagoing junks bring shark and squid to market. China is the kaleidoscopic fantasy of Szechuan in mid-winter, where soaring mountains are terraced with the mirror waters of rice fields reflecting shrine and bamboo clump, palm and winter peas as they descend in liquid steps from the heights to the lush valley.

China is the full harvest moon shining over houseboats on Soochow canals. China is the turgescent stench of rotting kaoliang drowned in miles of flooded countryside. China is the urgent three weeks of spring on the Chengtu plain, when winter wheat is harvested, the fields plowed, fertilized and flooded, plowed again and harrowed before spring rice is transplanted. China is the silhouette of camel trains bearing coal from the western hills, or the rhythmic chant of rivermen on hands and knees, straining and clawing at towpaths to drag their boats through the rapids of the Yangtze gorges. China is ten thousand pictures of people and places. It is a complex interaction of man with a varied and often beautiful environment. It is the surviving old and the struggling new.

The Chinese environment is vast, with $3^1/_3$ million square miles, more than 300,000 square miles larger than continental United States. Yet the interior two-thirds is so high, so dry, so rugged that most of the population lives in a coastal strip not more than one thousand miles deep and equaling only 43 per cent of the area of the United States. Even this agricultural portion of China is so rugged that only 27 per cent of it can be cultivated.

Man dominates the Chinese scene. Nowhere in the whole of agricultural China can one be alone. No valley is too remote to be inhabited. Human feet have worn trails across every hill and mountain. Human hands have hewn the stones that pave many of those trails. The dusty lanes of North China villages, the narrow stone-flagged streets of South China hamlets, the roads that lead to market, and the streets and *hutungs* of Chinese cities repeat the constant sound of human feet. On the plains, in the valleys and high on the mountain slopes every foot of available soil is patiently cultivated.

Who are these Chinese that have occupied and developed the eastern coast of Asia? Where did they come from and what are

they like?

The Chinese probably developed from a pre-human species in the territory where they now live. The earliest written records date from 1200 B. C., but archaeological discoveries show that Chinese culture began to develop on the dusty plains along the Yellow River long before. The Chinese slowly spread out and assimilated other groups until, centuries ago, they occupied the territory they inhabit today.

As they expanded they dominated new environments because they carried with them a system of hoe-culture agriculture that used irrigation to increase production. They maintained a basically vegetarian diet closely adapted to that agriculture. They had a written language in which was recorded the ideas of the sages, particularly those of Confucius, on which their form of imperial government was based. They had an educational system that effectively taught those ideas to their leaders and enabled them to permeate the thinking of the masses. They developed the family system, a major factor in the survival of race and nation.

The Chinese are energetic. Prodded by necessity and tradition, they work steadily for long hours. The Chinese are honest. In general, their word is as good as a written contract, although in times of turmoil they are likely to be unreliable individuals.

The Chinese are shrewd, astute in evaluating the advantages and disadvantages of a situation or a transaction. They are self-respecting and equalitarian in their attitudes. They have an ingrained sense of personal dignity. It is this sense of dignity within themselves, with a desire to respect it in others, that is a component of "face."

The Chinese have a genius for friendship. Friends will go to incredible lengths to help one another, and a friend may turn to the friend of a friend for almost any kind of assistance. This friendship is a two-way street. When in need your friends will just as readily look to you for help.

The Chinese are "familyistic." We Americans like to think of ourselves as being individualistic. We strive for individual satisfaction and advancement. The Chinese, however, are conscious of family loyalty above all.

The Chinese are almost incredibly poor. One rainy day during the war a member of the Friends Ambulance Unit came out of his hostel in a small town deep in western China to find an old woman who might have been in her sixties lying in the mud under one of their charcoal-burning trucks. In her hands she held a clean teacup under the crankcase drain bolt. Patiently she

waited for a drop of old dirty crankcase oil to seep past the tightly-washered bolt.

When the unit member spoke to her she begged permission to catch the leaking oil. The permission was gladly given and the worker went about his day's activity. When he returned for lunch the old woman was still there. Late in the afternoon she finally crawled out with a few teaspoons of worn-out oil that she could sell. Yet she was happy to have been able to get it even at the cost of a day lying in the mud.

Root cause of this abject poverty is overpopulation. No one really knows just how many Chinese there are. There seems little doubt that there are between 450 and 500 million. How do these millions make their living?

Eighty per cent of them are dependent on agriculture. Exclusive of Manchuria there are only about 217 million acres of land under cultivation, as compared with 365 million acres under the plow in the United States. This paucity of arable land in China, combined with a vast population almost entirely dependent on agriculture, has caused an overwhelming pressure of population on the land.

This means that there are approximately 1,500 persons actually living on every square mile of cultivated land—in many localities the population density far exceeds this average to balance the places where it falls below. The farm population has been squeezed into the confines of every little valley, up the slopes of every hill where any soil can be found, and onto marginal lands where scanty and erratic rainfall is a constant hazard. It has caused a modification of the terrain greater than that of any other area of equal size in the world. Nearly half the land under cultivation is irrigated; about a quarter is terraced.

The farmers of China have worked out numerous clever means to meet the problems set by climate, soil and topography. The country is divided into the dry North and the wet South. The North China farmer has tailored his activities to conserve the limited moisture that falls on his soil and the precious nitrogen plant food found in the organic wastes of field and household, and to make the most of limited amounts of fuel. In the south the overriding need is to utilize effectively the much larger amounts of water that the rice plant requires.

Chinese agriculture, though pre-scientific hoe-culture, is surprisingly efficient in terms of yields per acre. Yield of the basic grains is actually higher in China than in the United States. China produces an average of 67 bushels of rice per acre as compared with our

47 bushels, and 16 bushels of wheat to our 14. We produce 25 bushels of corn to China's 21, and 177 pounds of cotton lint to China's 168. This is not a bad record for an agricultural system that has been established for thousands of years and has undergone no major changes for centuries.

The average Chinese farm is 4.18 acres; the average American farm is 157 acres. On the Chinese farm 6.2 persons live, while only 4.2 persons live on the American farm. There are 15.7 acres of land in crop for every person living on the American farm, but in China there is only 0.6 of an acre. On his tiny farm, the Chinese must produce three-quarters of the food he consumes, his fuel and fodder and enough cash crop to pay his taxes and purchase the things he must buy.

But if the average farm size is only four acres (and 65 per cent of all farms are smaller than average) surely there are a few large farms? Of the farms surveyed by the largest and most reliable study made thus far, about 7 per cent were called "very large farms." The average size of these very large farms was only thirteen acres! By American standards there are no large farms in China.

It is not easy to state the value of Chinese farm production in terms of currency. It is more meaningful to calculate production in "grain equivalent," a method used by professional agricultural economists by which everything is given a value in terms of grain, rather than money. This method is particularly applicable to China, where for ages stored grain has been the real measure of wealth.

Production for the entire farm population averaged 980 pounds of grain equivalent. The average productive capacity of the farming people of China amounts to only fifteen or sixteen bushels of grain per person per year. In terms of labor, one adult male working one year on a Chinese farm produces an average of 3,080 pounds of grain. In the United States, one man working a year produces 44,000 pounds, over fourteen times as much.

In addition to her rural population China has more than 100 million city dwellers, the majority of whom depend on trade for a livelihood. Ninety-five per cent of business is still done by the old-type shop handling one class of commodity, grouped together on one street and organized into guilds. City streets are called Silk, Fur, Tea, Pottery, Metal, Medicine, etc., representing both the business and the guild.

Finance has been a major source of livelihood, from the large modern banks which before the war were beginning to stabilize the economic life of China, to

pawnshops where loans are made against every conceivable kind of property. In every city there is a large group that makes its living from government—city, county, provincial and national. In recent years the professions have begun to grow.

While the cities have modern factories of one kind or another—cotton mills, machine shops, flour mills and auto repair shops—well over 90 per cent of China's industrial production still is the result of pre-machine-age methods. Blacksmiths and coopers make wooden tubs and water buckets. Cabinetmakers turn out furniture from exquisitely carved jade inlaid treasures to crude stools and tables. There are silversmiths, tailors, jade carvers, jewelers, glassmakers and glassworkers.

While there are some wealthy folk in the cities the great majority, like their peasant fellow countrymen, are poor.

Learning and the scholar have long been venerated in China, yet if the ability to read and write a simple letter is taken as the measure of literacy, between 75 and 80 per cent of Chinese over 7 years of age are illiterate. Even so there are upwards of 100 million who can read and write, and the illiterates know a great deal about China's history from the story-teller and the theatre and participation in the traditional culture. One of the remarkable achievements of the past ten years has been the growth of popular and formal education at all levels. In spite of the fact that the college population has increased from a little over 40,000 to better than 120,000 in these years, the total number of college-trained people that China has to man her huge society with modern leadership probably does not exceed 250,000.

In spite of the evidence of present-day turmoil, the Chinese have a long, distinguished history in the field of government. The mood of government has been set by the father-son, emperor-subject thinking and feeling that is basic to Confucianism. It placed the emperor and his representatives in a position of power and importance, provided moral sanctions for the beliefs that supported that position and obligated the subject to obey and honor the emperor. Result — government firmly based on a hierarchy ruling from the top down.

The absolutism of this hierarchy was modified, however, by the belief that people are by nature essentially good and the emperor must provide an example of character and justice. The influence of this example was to be reflected in the court, where each minister would conduct his affairs according to the precepts of virtue, in turn passing the substance of good government down to the provinces, the districts and the

local magistrates. Finally, all fathers would become virtuous and would rule their families with a virtue equal to that of the emperor.

The moral obligation to rule by virtue was reinforced by the public right to revolt when the emperor ceased to do so, a privilege that has resulted in more than twenty dynasties in the course of Chinese history.

While the Chinese from long experience are conditioned for government from the top down, the functions of that government are largely confined to the keeping of the peace and the collection of imperial taxes. At the local level government has been a matter of family and clan units working out their problems by consultation, compromise and varying degrees of group decision.

To raise standards of living the Chinese must accomplish prodigious things. Agricultural production per acre must be doubled, the area under cultivation must be further expanded and much better use made of wasteland, half the farm population must be shifted to an industry that would need to equal in size and productivity that of the United States in 1929. While accomplishing all this the population must be kept from rising beyond 650,000,000.

If all these things can be accomplished, the average income per person could rise 600 per cent to equal about $130 per person per year, or about one-fifth the average standard of living that Americans enjoyed in 1929.

Does China have the natural resources? We have already seen that her agricultural land base is restricted by climate and topography. Her industrial resources are only reasonably good. Her estimated coal reserves amount to one-fourth of a trillion tons, placing her fourth among the nations. (The United States is first with 3½ trillion tons.)

China has little or no known oil reserves, she has limited high-grade iron reserves, is short of copper, but has outstandng quantities of tungsten and an excellent supply of tin. She has a bountiful supply of antimony and plenty of sulphur. Her potential water power is one of her great resources but she is severely limited in lumber and wood fibers.

Although the description of China as a geographic area endowed with tremendous mineral resources has been frequently exaggerated, her total of natural resources appears sufficient to supply the raw materials for the development of an industrial plant as large as that of the United States in 1929.

This is China. An ancient society, exhausted by nine years of international war, focal point of world ideological conflict, sapped by civil strife. Yet a lovable, able

people engaged in an epitome of the struggles of our times—particularly the struggle of that two-thirds of mankind who live at the survival line to raise their standard of life. The course of our lives will be deeply affected by their struggle.

Chemicals Recharge Useless Desert Soils

Condensed from the Christian Science Monitor

Albert E. Norman

AUSTRALIA is transforming a 10,000-square mile wasteland of stunted growth and hitherto useless soil into one of the most attractive land settlement projects ever launched.

Divided into the so-called "big desert" and "little desert," the huge rolling wasteland now in process of reclamation straddles the state borders of South Australia and Victoria. Until recently this area defied all attempts to develop it.

Secret of the transformation was unlocked in the soil research and agronomy experimentation over a five-year period of the Australian Council for Scientific and Industrial Research.

The vast wasteland is being turned into lush pastures by a simple process: Addition to the soil of about 80 cents' worth of copper sulphate and zinc sulphate an acre, mixed in with ordinary dressings of superphosphate.

These hitherto missing elements make all the difference. They "hold" the soil to fertility for up to five years at a time. At such intervals, they must then be renewed

This discovery—for which chief credit goes to Senior Research Officer D. S. Riceman of CSIR—has brought at least 2,000,000 acres into highly productive use—testified by fertile clover pastures. It is believed another 2,000,000 acres can be developed.

Although enjoying an agriculturally adequate rainfall of 15 to 20 inches yearly, the land has been a tough one for those few hardy pioneers who drove their wagons into its wastes in years past and have hung on there to battle it ever since. The land was so poor that it would barely support one sheep to every 50 acres.

Reprinted by permission from the Christian Science Monitor,
1 Norway Street, Boston, Mass., Feb. 2, 1949

In face of such difficulties, the greater part of the land lay waste, covered in wild honeysuckle, titree, yucca and heath, rolling away mile on mile to seemingly illimitable horizons.

Now the pioneers are the first to reap the fruits of the CSIR soil research successes.

Already these settlers are building up their holdings and carrying more stock to the acre than ever before. One such settler reports carrying 3½ sheep to the acre, and conservative estimates presage eventual flocks on the "big desert" equal to the present South Australian state total of 7,987,000 head.

People moving into the area are bucking about the term "desert." "It isn't a desert any more," they say.

They have a lot on their side too. The climate is temperate and an abundance of sweet subterranean water "brings in" a well quickly, in most places at about 16 feet.

From the standpoint of commercial development, ease of entry and access to markets, the huge reclamation project appears to leave little to be desired. With its western edge within 100 miles of the state capital of Adelaide and traversed by the interstate railroad, the big sweep of country compares with any similar productive area in South Australia.

Its prospects are so good that a spate of land deal is now in process with prices running around $1.04 (6/6d) to $3.20 (20s) an acre.

The neighboring Victoria State Government is watching developments with close interest. Its department of agriculture already is making soil tests in the contiguous Victorian "little desert" area covering approximately 1,000 square miles.

And at this stage, there seems no reason why that area should not be just as capable of development as its larger South Australian counterpart. Over the state border, as irrefutable testimony to the fact, new sheep are cropping newly fertile pastures.

And in staking out new holdings where once grew heath and yucca, the trend shows South Australians intend to go on expanding this kind of "testimony" into ever-widening areas of proof.

COLLEGE OF AGRICULTURE
UNIVERSITY OF WISCONSIN
MADISON

How to Cool a House

Condensed from Capper's Farmer

G. H. Larson
Kansas State College
as told to Eula Mae Kelly

WHY not do something about making your farm home cooler and more comfortable? There are practical, inexpensive methods of home cooling.

Any method of cooling involves 3 factors, each of which has a definite relation to comfort. These factors are temperature, relative humidity, and air movement. High temperatures are bearable if the relative humidity is low and the air is kept moving. Likewise, you can stand high humidity if the temperature is moderate.

So far the cooling methods that show greatest promise at relatively low cost are: (1) insulation of the house; (2) air movement; (3) cooling with night air; (4) cooling with well water and (5) evaporative cooling.

Effective insulation not only keeps your home warm in winter but cooler in summer. Insulation of walls and ceilings helps to retard entrance of heat from the outside. Opening doors and windows lets heat come in, particularly if a strong wind is blowing. It will enter also thru cracks in the walls around these openings.

More than 40 per cent of the heat entering an uninsulated house comes thru the roof. Attic temperatures are 20 to 25 degrees higher than outside temperature and cause a more rapid heat flow thru ceilings than thru walls. So ventilation of the attic and insulation of the ceiling just below the attic are important in keeping heat out of the living space below.

Wall insulation also helps in reducing the quantity of heat reaching the interior of the house. Storm windows, altho usually thought of in connection with winter, will also help keep heat out in summer. Awnings on the south and west windows will reduce radiant heat from the sun.

Even the color of your house paint has some effect on the amount of heat absorbed by walls and roof. A house with light-colored walls exposed to the sun will absorb less than half as much heat as the same walls painted with a dark-colored paint. This is due to reflection of heat by the

Reprinted by permission from Capper's Farmer,
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light-colored surface.

Regardless of the type of cooling system used, insulation will make it increasingly effective by reducing the amount of heat that must be removed from the interior of the house.

The second method of cooling, by air movement, necessarily involves the use of electric fans. Air in motion tends to cool the body by evaporating perspiration from the skin. This effect is noticeable outdoors on a hot day when a breeze is blowing. In the house, on the same day, altho the temperature may be several degrees lower, it seems hotter because the air is static.

By means of fans, house air can be circulated and mixed so that it will produce a cooling effect when it passes over the skin. Low-priced fans are usually high-speed with rather low air-moving capacity and no oscillating features. The higher-priced fans are a little slower. They have larger blades and move more air with less noise, and have speed-adjustment and oscillating features. You can buy fans with adjustable floor stands, ceiling mountings, wall-bracket mountings or the usual table-mounting type. With good insulation in a house, sometimes air movement alone will provide daytime comfort.

The third method, and one which is proving increasingly practical, is that of night air cooling. In drier regions, night temperatures are surprisingly low even when heat records are broken during the day.

For the success of such a method temperature of the night air and the amount of air passed thru the house are the important factors. Fifteen to 25 changes per hour seem to be necessary to give the best results.

The simplest way to circulate night air thru a house is by natural ventilation. Louvers or open windows in opposite ends of the attic permit the escape of hot air. A centrally located opening in the attic floor must be provided to bring hot air up from rooms below. All windows and the opening in the attic floor are opened. Cool air enters the windows below and absorbs heat from walls and furniture. This causes it to rise and pass thru the windows and louvers above. This simple method works fairly well in 2-story houses due to the chimney effect produced by the height. It is not well suited to 1-story houses.

Forced-circulating, warm-air furnaces can help cool your house. The furnace fan will draw night air in and discharge it thru the ducts in various rooms where it picks up the heat and passes out thru the opening in the attic floor. Windows should not be opened for best results. Cool air is admitted thru a basement window. The only expense will be

the electricity required to run the fan.

Probably the most effective method of circulating night air is to install a large fan at the opening in the attic floor. It discharges the warm air into the attic space and forces it to the outside thru louvers or windows. The warm air is replaced with cool outside air drawn in thru the windows. This kind of ventilation is effective almost immediately.

Such attic fans are generally satisfactory. They will give good service for 10 to 15 years. The best way to install such a fan is to set it on the floor of the attic with a canopy or hood over it so that the fan must draw air from the rooms below. The installation must be built to fit the house. It is best suited to houses which have a central hall on the second floor which permits taking air from different rooms and pulling it all from the lower part of the house. If the fan is mounted on sponge-rubber pads, the little noise it makes it not transmitted to the frame of the house.

The fan should be started as soon as outside temperature is below that of the house. By 10 or 11 o'clock the house should be comfortable enough for sleeping. Maximum cooling comes by letting the fan run all night.

A 36-inch-diameter fan with large blades and a slow speed of 400 revolutions per minute, is suggested for the average-sized home. It should move about 8,000 cubic feet of air per minute if installed with free discharge of air.

Whenever the temperature of well water is 60 degrees Fahrenheit or less, and a plentiful supply is available near the surface, it can be used successfully in cooling the home. The complete system consists of a well, a water pump, a radiator, a fan or blower, and a means of distributing cool air to the rooms.

Water is circulated thru the radiator by the pump. Air is blown thru the radiator and gives up some heat to the water. About 1 gallon of water per minute must go thru the radiator for each 1,300 cubic feet of space cooled, when temperature of the water is 60 degrees. Ordinary-sized homes use 4 to 5 gallons per minute. This method is well adapted to the farm home because water used can be put on lawns or garden or may be pumped to tanks for livestock.

The cost for such a system will range from $55 to $500, depending on the depth and location of the well and the number of rooms to be cooled.

The fifth method of low-cost cooling is air cooling by evaporation. It is successful only where relative humidity is around 25 per cent or lower. Its use, therefore, is limited to semi-arid areas

or sections where dry conditions prevail.

The window-box cooler is the most common of this type. It contains some porous material like excelsior, cotton fabric or coke, which is kept wet by a water spray. Air is blown or drawn thru the wet material and evaporation of the water cools the air. These units are easily made or can be purchased. Small ones can be rented for the summer season for as low as $25.

Let's Use Fertilizers Wisely

Condensed from Iowa Farm Science

L. B. Nelson

WE SEEM to be pretty well agreed in Iowa that it pays to use commercial fertilizers. But a lot of us are still trying to find the right ones to use for the right land and the right crop. We are still not certain as to HOW to use fertilizers to get the most from them.

This article will offer some suggestions of steps you can take to get more from your fertilizer.

Fertilizer use is a part of any good soil management program. It does not replace other desirable practices. Rather, fertilizers are "most efficient" when they are used along with liming, manure, crop rotations and all the other practices which help maintain high production.

The first step in using fertilizers efficiently is to find out just which fertilizers your soil needs. A good soil test is the best method we know of for doing this. Soil tests may not tell you the exact needs of your soil. Still, they give you a good estimate of the response you can expect from different fertilizers.

Many soils are deficient in some of the nutrient elements needed for good plant growth. The three most commonly lacking—nitrogen, phosphorus and potassium—are the elements usually sold in commercial fertilizers.

If your soil lacks just one of these, then only this one should be applied. Many soils, however, are deficient in more than one nutrient element. You may need a complete fertilizer—one with nitrogen, phosphorus and potassium.

One element can limit crop

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yields. No matter how much of the other elements you apply, you will not get good yields as long as one element is lacking.

You must not only supply all of the needed elements, but also in the proportion they are needed.

Too much as well as too little of one element can make your fertilizer inefficient. For example, applying potash on soil that is already high in available potassium may actually reduce yields.

It pays to add fertilizers only as long as the increase you get is worth more than the cost of applying the fertilizer. This includes the cost of machinery, labor and other items as well as the cost of fertilizer. When crop prices are high relative to fertilizers, you can afford to use more of them than when crop prices are low. Where fertilizers increase the yield of more than the first year's crops then you need to consider the increase in the crops which follow.

There are two general kinds of phosphorus fertilizers sold, so you will want to consider which one to use for your soil and crops.

Rock phosphate and superphosphate both supply phosphorus. Yet superphosphate is much more available for immediate plant use than is rock phosphate, especially for corn and small grains.

Superphosphate gives good results on all soils deficient in phosphorus. Rock phosphate has a more limited use in Iowa. While it works fairly well on alfalfa and clovers grown on acid soils, it is much less effective both on soils that are naturally high in lime and where large amounts of limestone have been applied. Apply rock phosphate only on acid soils.

The kind of crops grown also affects the use of fertilizers. On most soils corn gives a better response to potassium fertilizers than do small grains or hays. Legume crops do not require nitrogen fertilizers since they obtain this from the air. Small grains usually need both nitrogen and phosphate. On most Iowa soils legume hays need some phosphate fertilizer. So even on the same soil, different crops will respond differently to the same application of fertilizer.

With corn especially, it helps to put the fertilizer where it will do the most good—in bands close to the seed. The fertilizer attachment on your corn planter does this. For small amounts of fertilizer it is by far the most efficient method of application.

The young corn plant with its small root system cannot reach much of the fertilizer that is broadcast and mixed with the soil. It may take two or three times as much broadcast fertilizer to get the same yield increase as that produced by fertilizer placed in bands beside the seed.

Fertilizing corn in a band beside the seed at planting time gets the plant off to a good start. It increases early growth; it advances maturity, and may increase the final yield by as much as 7 to 12 bushels per acre.

Results in Iowa show that small grains also benefit from fertilizer placement. Oat yields from plots where phosphate was drilled along with the seed were 2 to 4 bushels per acre higher than in similar fields where fertilizer was broadcast or disked in. In addition to this, drilling the oats usually raises yields 3 to 4 bushels per acre over oats that are broadcast.

Broadcasting fertilizers with an endgate type of spreader often gives very poor distribution. A lot of fertilizer falls directly behind the spreader, little is spread at the sides. Use a low-down type spreader if you broadcast.

You can increase corn yields by gauging the rate of planting to the amount of fertilizer applied and to the fertility of your soil. In general, we need thicker stands in Iowa. Thicker planting would make more complete use of plant foods.

For most Iowa soils experiments show that a final stand of about 3 stalks per 40″ by 40″ hill (about 12,000 stalks per acre) is desirable. Some soils will support stands heavier than this; a few produce best with thinner stands. Most efficient use of fertilizers usually results when the ears weigh a half pound or a little over.

This is a smaller ear than normal. But there are more of them. Your total yield is higher than from fewer plants producing larger ears. And you make more efficient use of your fertilizer.

Moisture and drainage conditions also affect fertilizer use. On wet, poorly drained soils it takes more potassium to give corn yields the expected boost. Where moisture is a limiting factor, adding fertilizers will not increase yields.

Lime deficiency can also limit your crop yields. If your soil is acid, then liming is a first step in getting efficient fertilizer use. Fertilizers generally are most available when the soil is just slightly acid. So don't over-lime.

Many other practices besides the use of fertilizers are involved in producing high crop yields. Using good crop rotations, control of weeds, proper tillage, use of manure and other sources of organic matter—all are important to high yields.

Your fertilizers do their best work only when these other items are making their full contribution to fertility.

Seeding From the Sky

Condensed from Western Farm Life

Neil Kimball

A MAN, who was a former doctor in Irwin, Pennsylvania, and Seattle, Washington, with the power of a biblical parable behind him and an intense desire to save the soil for mankind, has taken on the deserts and wastelands of the nation, determined that "the desert shall rejoice, and blossom as the rose."

He is Dr. Lytle S. Adams, whose seed planting by air is being closely watched by agronomists and agriculturalists of this and many other nations. In 1947 congress appropriated $175,000 for use in planting 50,000 acres of Arizona desert land. He plants Lehman's love grass a hardy species imported from North Africa.

Dr. Adams is now under contract with the Department of the Interior, after special wartime assignments with the army and navy. The army is loaning him a big Fairchild transport plane which the graying doctor will use in subsequent operations. Congress last year allowed $200,000 of a requested $2,500,000 for continued air planting. More work will be done in Arizona and some in Montana and Wyoming. Many types of experiments are taking place at the huge King Ranch in Texas, the Texas experiment station in Spur, and at San Diego.

Originally, Adams' plan called for reseeding large acreages of rangeland and reforesting blighted areas by air. He has expanded now to include seeding of vegetables—carrots, spinach, lettuce, celery and onions—which can be planted with ordinary drills or planters, or by a new drill of his own invention.

And it all came from the rabbits. Watching rabbits around the large cactus plants of the Southwest, Dr. Adams observed that plant life sprang from rabbit droppings.

The entire Adams operation is mobile. Pellet-making machines, capable of turning out 30,000 pellets a minute, are moved to the land which is to be seeded. Made from a mixture of nitrogen, phosphorus, potash, vitamins, and soil, and containing rodent and insect repellent, pellets resemble little balls. Enough moisture is in the coating to ensure a start for the

Reprinted by permission from Western Farm Life,
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seed.

In reforestation work, Dr. Adams uses a pellet with a metal covering, which has holes in the top to admit moisture. These tiny "bombs" drive into the ground when dropped from the air.

In addition to planting crops, grass and trees, Dr. Adams says he can effectively attack plant destroyers such as boll weevils with a small chemical "bomb" which loosens killing chemicals. These mushroom up from the ground, doing a more effective job than present spray methods, which many times, he says, reach only the upper parts of leaves or branches. By the same process he can make war upon flies, mosquitoes and other insects by dropping proper pellets on water areas.

Dr. Adams challenges the nation with startling statistics. We are, he says, living off one-third of the land with the other two-thirds badly in need of care. We have 750,000,000 acres useless now and a like amount needing attention such as seeding and water conservation. Another 145,000,000 acres under the Taylor Grazing Act needs attention. This is some of our best grazing land.

He believes we must have grass on our great watersheds to hold the water and lessen the effects of erosion. He estimates that Boulder Dam will be useless in another 50 years because of the terrific amount of silt which is washed into the water above the dam each year. He says that the seeding of the land around the shores of the lake would safeguard the future of the project.

Dr. Adams estimates that once under way on a large scale and with speed of seeding, low manpower costs, and certain germination, the $3.20 per acre which seeding now costs may be cut in half. Vegetable seeding cost may be lowered due to high rate of germination and controlled spacing which eliminates need for thinning, he maintains. Reforestation may be accomplished for as little as $3.50 an acre against the present cost of $15 an acre for hand seeding.

Governments of other nations are looking to the Adams methods and inventions with interest. Australia, New Zealand, China and North Africa have shown real interest. New operating companies are under way in some nations. Mexico's President Aleman sent his private plane to San Antonio to pick one of Dr. Adam's specialists for a survey of Mexico's blighted regions with a view towards employing the air seeding program for salvation of lands.

Dr. Adams is air-minded. He invented the air mail pickup system which operates in many sections of the country. He knows that "the farm is still the broad base upon which the entire United States economy rests."

"The air planting we are doing on the western ranges of the United States," Adams says, "is developing a system which will be beneficial to every American farmer, large or small. In addition to the public lands, there are approximately 700,000,000 acres of privately-owned farms in conservation districts receiving government aid and getting some sort of conservation treatment. The pellet reseeding program, if undertaken on a larger scale, will provide new cash crops for farmers everywhere in the production of seed, while the grass from which it is harvested is returning to the soil the lost elements.

Adams has planted more than 100,000 acres by air since 1944. Land in every possible degree of deterioration from soil erosion has figured in this work, including many areas of Nevada, Utah, Idaho, Wyoming and New Mexico. Where areas have been reseeded to grass in this manner, and cattle have been kept off until it has really had a chance to take hold, results have been very good, according to Adams.

The United States chalks up an estimated $3,500,000 loss annually for soil erosion. Adams hopes that aerial planting will reduce this amount substantially. Recently about 15,000 acres of isolated, semi-desert land in the Skull valley area in Utah have been receiving his attention. Known as the Skull valley project, this area, about 60 miles southwest of Salt Lake City, is being reseeded in cooperation with the United States bureau of land management, one of whose duties is to maintain and bring back into production federal ranges such as this.

Adams' first attempt at seeding from the air was in New Mexico in 1944, with the government sponsoring the plan. The five to eight seeds which each pellet contained were weighted and protected by the pellet itself, which was made of dry, compressed loam, clay and fertilizer. About nine pellets, each about the size of a grape, are allotted to each square yard of land seeded. The pellets are heavy enough so that their descent is not unduly influenced by the wind.

The seeds within the pellets will germinate in areas having as little as 9 inches yearly rainfall. The pellets absorb the moisture, becoming sticky and soft, and allowing germination to take place.

Present equipment will reseed about 1,000 acres a day, Adams estimates, and 18 days were allotted for the actual reseeding at Skull valley. It is hoped that cost per acre can be scaled down as operations are extended.

Factors in Fattening Steers

Condensed from the Michigan Farmer

G. A. Branaman
Michigan State College

THE first step in a sound cattle feeding enterprise is to buy at the right price for the grade of the cattle. Then the cattle should be finished according to their grade.

Choice cattle costing near the top of the feeder cattle market must be well finished to sell accordingly. Such a finish is not desired on cattle of a lower grade, nor will plain cattle improve greatly in grade or price with extraordinary fatness.

Costs increase, too, as cattle become fatter and heavier, and they must sell higher to warrant additional feeding. Costs in experiments at Michigan State College show that in a feeding period of 9 months, gains on the calves during the last 3 months may vary from 30 per cent to 50 per cent higher than during the first 3 months. A similar increase has been found in yearling steers fed 6 months. A conservative ration in the beginning with a larger proportion of grain later, permits growth on calves before they become so fat, and later gains are more economical than when full-fed over a long period.

Numerous experiments at Michigan State College and at other agricultural experiment stations have established certain other facts. Choice to prime calves require 6 to 10 months of liberal feeding, while similar yearlings require 5 to 8 months. Medium and common grades, such as dairy-bred and nondescript colors lacking beefiness, may be fed in either of 2 ways. They may be fed 3 or 4 months on liberal grain rations, or from 4 to 6 months on a full feed of corn silage with protein supplement and hay. Cattle of good grade will fit in between these 2 extremes. Of course, cattle in thin flesh require the longer feeding period and young cattle tend to grow and fatten more slowly than older ones.

It rarely pays to feed grain at all unless cattle are fed at least 60 days. Otherwise there will be little increase in fatness and in price. However, silage-fed cattle or 1000-pound grass-fat steers and heifers may take on a final finish with 45 to 60 days liberal grain feed. A rise in grade and in selling price should be a chief

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objective in such procedures.

A full feed of grain on a self-feeder is about 2 pounds daily for each 100 pounds of body weight when fed with about one-fourth as much hay, or 20 pounds of grain and 5 pounds of hay for a 1000-pound steer. About one-third of the grain may be replaced by full-feeding corn silage, and also up to one-half of the hay will then be refused.

Three lots of calves self-fed grain for 192 days ate 11.4 pounds of corn, 1.3 pounds of linseed meal, 8.4 pounds of silage and 2.6 pounds of hay, gaining 2.41 pounds daily. Other lots limited to 7.4 pounds of corn and the 1.3 of linseed meal, ate 18.5 pounds of silage and 3.8 pounds of hay, gaining 2.31 pounds daily.

High protein feed, like soybean, linseed, cottonseed meal, or a good mixed feed, is very important when silage is fed, especially for calves. At least a pound of protein rich feed daily is needed to start the calves when good legume hay and silage are fed, or up to 2 pounds when no legume is fed. The amount should be increased later for these calves, and yearlings should have slightly larger amounts per head daily.

Protein supplements encourage feed consumption, faster gain, and better finish on the cattle. The higher the grade of the cattle, the better it pays; also the poorer the hay, the better it pays to feed protein supplements. When no corn silage is fed, the amount of protein supplement may be reduced if most or all of the roughage consists of good legumes. Grass silage has proved to be only slightly superior to well cured hay from the same field. It feeds more like hay than it does like good well-eared corn silage.

When is it wise to feed less than a full feed of grain and how much less? Experiments at Michigan State College for a quarter century have been directed at this question. Kinds of cattle and prices of cattle and feeds determine the course of action.

Iowa State College tests finished recently with "choice" yearlings and even with 1947–48 high corn prices showed as much or more profit with full-feeding. On the other hand, with "medium" grade steers considerably more hay may be marketed and satisfactory "medium" finish attained by limiting the corn somewhat. We have found that a pound of corn daily for each 100 pounds of steer weight, or 10 pounds of corn (for a 1000-pound steer) with good legume hay will give about the same gain and finish as a full feed of 40 to 50 pounds of corn silage, with 2 to 3 pounds of protein supplement and 3 pounds of hay.

One or the other of these rations fed for about 5 months will

produce about 1.7 pounds daily gain and result in "medium" to "good" finish on yearling steers. Of course, as mentioned previously, a more liberal corn feed will shorten the time and also reduce the amount of hay eaten. Michigan State College experiments have shown that calves will not fatten much but will grow at the rate of 1.5 to 1.7 pounds daily on the limited corn or on the silage ration balanced for protein.

Cattle may attain a certain market finish by feeding a moderately limited grain ration for a longer time than when full-fed. As good if not slightly higher quality carcasses have been produced by the longer feeding method, and more roughage may be used in the process. About the same total corn would be fed in each case, and the cattle would weigh more. The cattle mentioned above in the Iowa experiment were all sold at the same time and those on limited corn did not have a chance to fatten over a longer time so as to eventually reach the same market finish.

The use of pasture fits into this roughage program especially well. Cattle gain more than twice as fast on pasture alone as on hay alone, and those fed grain on pasture tend to gain more rapidly than when fed grain and hay in the dry lot.

Time of marketing is usually the chief factor in determining levels of winter feeding and also in selecting the time for starting grain feed in a pasture program.

Pack Vitamins in Pigs for Winter

Get as much pasture under a pig's belt as possible when winter sets in. That's what Damon Catron, animal husbandman at Iowa State College, tells farmers who have growing pigs on their farms now. He points out that good green pasture and a balanced supplement are the best sources of vitamins.

A growing pig will store vitamins picked up in pasture. As he is moved to a dry lot, the pig will call upon these vitamin reserves as they are needed for growth and for building up resistance to diseases. Catron says that the pig cannot rely entirely on the reserves and will need sources of B vitamins supplied in supplement. These vitamins are availabe in good quality alfalfa meal, fish solubles, milk by-products and distillers solubles.

—Hog Breeder

Streamlining Poultry Breeding

Condensed from Everybody's Poultry Magazine

Thomas E. Moncrief

Most poultrymen today are willing to pay a premium for better breeding.

The trapnest is a valuable tool in the hands of the poultry breeder. Without this instrument for measuring production, we probably would not have progressed to our present state in poultry breeding.

The first outstanding work with the trapnest was done in Oregon by James Dryden. His experiments, begun in 1907 and terminated in 1920, proved conclusively that "selection of breeding stock on the basis of annual trapnest records regardless of prepotency or tested qualities, is a certain method of increasing egg production." The other conclusions reached by Dryden almost 30 years ago are an outstanding example of foresight in poultry breeding, and the Oregon system is the one followed by practically all successful breeders today.

Today, poultry breeding involves the trapnesting of from hundreds to several thousand individually pedigreed pullets each year, trapping of mating hens all year 'round, tabulating of progeny records in every male and female in the special mating or pedigree pens, and a critical analysis of the results of this work, which often takes weeks of study.

Selective breeding for inherited characters affecting egg production hardly would have been possible without the trapnest, and it is quite probable that modern commercial egg farmers, as well as breeders, will use short interval trapping to eliminate unprofitable producers and thus make their plants more efficient and profitable.

Like all scientific developments, trapnesting is undergoing many changes. At official egg laying tests the policy continues to keep a complete record of all birds entered. That is, the traps are attended each of the 358 days of the test year. No eggs laid on the floor or roosts are considered. This policy dates back to 1911 when the Storrs and Missouri Tests were started.

Over the years there has been considerable variation in the method of calculating the records. A recent change permits a test to

Reprinted by permission from Everybody's Poultry Magazine, Hanover, Penna., February, 1949

estimate the egg weights from a sample taken during the first three days of the month, with the exception of the first two months of the test—October and November. Through experience and study it has been found that after pullets get over their initial period of production when egg weight increases gradually the size is quite uniform, showing no appreciable variation for at least 10 months of the laying test. The policy of using part-time egg weights is optional, however, and some tests still weigh all the eggs that are laid.

Trapnesting is an expensive operation. According to F. H. Hays of the University of Massachusetts, it has been estimated that daily trapnesting adds about one dollar a year to the cost of keeping a hen. This report was published in 1946, however, and today the cost undoubtedly is higher.

Many breeders have found it less expensive to purchase eggs, chicks, or breeding stock from well established breeders who do progeny testing than to do the trapping and record keeping themselves. Many hatcherymen also have preferred to establish key flocks supplied with pedigreed cockerels from good breeders to produce the chicks for their other flocks. This has caused a real increase in the sale of pedigreed chicks during recent years.

Because of the great amount of time and expense involved in trapnesting, many attempts were made early in the 1900's to estimate annual egg production by using limited periods of records. In 1930 a Frenchman named Voitellier reported on limited trapnesting at the National Egg Laying Competition at Versailles, France. Since then many American workers have reported on this.

In 1946, Hays of Massachusetts listed the following kinds of limited trapnesting:

1. First two days of each month beginning October 1 and ending September 2.

2. First week of each month beginning October 1 and ending September 7.

3. Daily during October.

4. Daily during August at the end of year.

5. Daily to January 1.

The information desired through limited trapnesting includes the probable annual egg record, egg weight to January 1, hatching season egg weight, annual egg weight, weight at first egg, clutch size during winter, spring, summer and fall, winter pause duration, annual persistency, and length of life.

Hays found that you can get an accurate estimate of annual egg production by trapping two days each month, the first week of each month for 12 months, or daily for the month of August. Egg weight to January 1 can be told by two-day weighings or

one-week weighings in October, November, and December or daily weighings in October. Annual egg weight may be closely estimated by weighing eggs on the first two days of each month or during the first week of each month, daily in August, or daily from the first pullet egg to January 1.

You can get good measure of winter intensity by trapping the first two days of each month or the first week of each month from October through February, or daily from the first pullet egg to January 1. Daily trapping to January 1 also affords a good measure of winter pause duration. Trapnesting daily in August gives a satisfactory measure of persistency.

A short period of trapping in the late winter or early spring can be quite helpful in eliminating birds laying at a low rate or producing small, off-colored, or poorly shaped eggs.

Breeders preparing to send birds to egg laying tests may pick out the most desirable layers by trapnesting for 15 to 20 days before sending them away. This can give them egg weight, length of cycle, and total early production.

Back in 1941, the National Poultry Improvement Plan reported that "even one- or two-day-a-week trapnesting is quite accurate in determining family production, although it is not sufficiently accurate to determine individual production."

In August, 1942, the USDA issued a table for computing egg records from five-day-a-week trapnest records. This was a forecast of things to come, for just six years later it issued a table for computing egg records from three-day-a-week trapnest records.

E. B. Parmenter, oustanding R.O.P. breeder of Rhode Island Reds, was one of the first to adopt five-day-a-week trapping and on the strength of experimental data on part-time trapping showing satisfactory accuracy for several plans, he started the formulation of the latest three-day per week trapping proposal through the Massachusetts R.O.P. Association. This proposal was submitted at the N.P.I.P. Convention in 1948, and was adopted.

Mr. Parmenter immediately put the three-day-a-week system into practice and likes it very much. On the Parmenter farm half the pens are trapped the first of the week and the rest the last half, with Sunday free of all extra labor.

"All breeding work is based on family averages, whether it be a study of production, shell, texture, egg size, disqualifications, livability, or what not," says Mr. Parmenter. "It is immaterial to most breeders whether a pullet lays 220 or 230 eggs. In other words, a small variation in egg production by each bird or by all birds in a

family does not change the breeder's opinion of that family."

Dr. A. B. Godfrey of the USDA recently reported that when the breeder summarizes his records on a family basis, any inaccuracy from three-day-a-week trapnesting will tend to be reduced to a point where it is of no consequence in a breeding program in which selection is based primarily on results from progeny testing. He points out, however, that the N.P.I.P. does not recommend that a breeder adopt such a program merely to reduce his labor if he does not trapnest more than 200 to 400 birds. He should adopt such a program if it will enable him to trap more birds and thereby progeny test more sires and dams.

Dr. A. W. Nordskog of Iowa State College claims that "little is to be gained from trapnesting families as large as eight in number more than seven days per month or two days per week."

The past war, with its shortage of farm labor as well as resulting higher labor costs, has caused many poultrymen to pause and re-examine their farm practices. Some breeders were practically forced to cut down on trapnesting. Perhaps this was a good thing, for it is not the trapnesting itself which counts, but the proper use of trapnest records. A mass of records not used or improperly evaluated are no better than no trapnest records at all.

The Dryden Farm in California was the leader in developing and using on a large scale a number of mechanical improvements in the technique of trapnesting and pedigree breeding. It was the first to use the visible card system in trapnesting and pedigreeing. It originated the visible wing badges which cut in about half the time involved in removing hens from trapnests and reading band numbers, as well as greatly increasing accuracy. A new device which will go around the wing rather than through the web, making application much easier, is now being manufactured by Mr. Dryden. He has also devised a number of other useful methods relating to trapnesting, such as a system locking entire batteries of trapnests open or closed at one time.

This year Mr. Dryden is trapnesting 9000 pullets. This is a much larger number of pullets being tested than on the average breeding farm, but he says that he has always believed that the more families tested, the greater the opportunity for breeding progress. He has rather large family sizes and annually trapnests many families of full sisters of 20 to 30 individuals each.

At least one eastern poultry breeder has been urging the adoption of a 10-months basis of trapping rather than a full year. The reason is that this would give the

breeder who may be limited in trapnesting space an opportunity to clear out those birds which have been trapped, and get ready for a new flock of pullets.

One argument against this proposal is that a 10 months period does not give the breeder ample opportunity to study the persistency of his birds, which is an important breeding factor.

The old is giving way to the new on breeding farms, colleges, and experiment stations across our entire country. From Massachusetts, the cradle of poultry breeding work, comes word that at the University of Massachusetts poultry farm they are completely sold on the new metal nests which are considerably smaller than the old wooden trapnest.

More than one breeding farm today uses inter-communication systems whereby the man operating the traps merely reports to the office by means of a "mike" slung in front of him. Recording machines, stream-lined record forms, and other modern equipment are used today to speed up the work, help reduce possible errors, and still supply all essential information for progeny testing.

The Farmer's Hands

By INA DRAPER DeFOE

In Portland Oregonian

Not by his face but by his hands
I know this man.
A wheat field stands
Beneath his palms. Not by his eyes
Though they are kind . . .
Long handled scythes
Have shaped these hands.
They know of birth,
Of all the richness in the earth.
They know the curve of horses' flanks,
How weathered are the heavy planks
That makes a barn secure in storm.
Not cold, these hands. They are as warm
And kindly as a knitted shawl
A woman dons in early fall.
And, Oh, how soft with gentleness
When aiding creatures in distress.
Not by his face, but by his hands,
I know this man.

Sweet Potato 'Bushes'

Condensed from the Farm Journal

Louis Franke

SOMETHING that looks mighty like a "revolution" is coming up in the sweet potato growing business.

It's a new variety, commonly called the Murff bush Porto Rican, but officially tagged Texas 51.

Texas 51 doesn't crawl all over the landscape like an ordinary sweet potato. It grows upright, like a peanut plant. Its vine is only a foot long; those on ordinary sweet potatoes, 10 feet!

This means that the new variety can be cultivated right up to the day of harvest, long after vine types are being choked with grass and weeds.

It's reasonable to assume that the Murff will thrive anywhere sweet potatoes grow, but to date it has been tested only in Texas.

The Murff is a yam type, having the juicy yellow meat preferred in the South and Midwest. The Jersey type, with white mealy meat, is a favorite in the East.

But sweet potato men are betting that all sweet potatoes, both yam and Jersey favorites, soon will be the bush type. This new variety, they say, will mean as much to the sweet potato industry as hybrid corn did to the Corn Belt!

Two years ago B. D. Murff, a vocational agriculture teacher at Fisk, Texas, told the Texas Experiment Station that his father, E . L. Murff, of Normangee, Texas, had a sweet potato that grew in bush form.

Ralph Michael, in charge of sweet potato experiments at Gilmer, asked Mr. Murff for a sample, and received five potatoes which went into the test plots.

Then Michael admits, he just about forgot the whole business. The Experiment Station receives hundreds of such samples every year, but they almost always turn out to be already established strains.

But in August, 1947, he noticed a short row of sweet potatoes that resembled peanut bushes.

"I got down on my knees, uncovered the potatoes in a few bushes, and chipped them for the color inside. The yield, quality, and color of those potatoes were almost unbelievable!"

Michael checked his records,

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Philadelphia, Penna., February, 1949

and a few minutes later was in his car on a fast 200-mile ride to Leon county.

Mr. Murff had eight 105-foot-long rows of his new variety. He told Michael that he was too old to expand his discovery himself, but that he'd like to turn over a part of his crop to Texas A & M College, to be increased and distributed to other growers.

"The fortunate thing about all this is that this sport or mutation happened on the farm of such a man as Mr. Murff," comments Dr. Guy Adriance, Texas A & M. Horticulture Department head. "Probably a dozen other farmers had slips off the same potato that produced Murff's new variety. But none of the others happened to notice what they had."

The Texas Experiment Station is releasing the new variety after only two years of testing—a testimony to the thoroughness of the preliminary work Mr. Murff did on his own farm.

He first noticed the plant in July, 1936, when laying by his crop. That spring he had bought the Porto Rican sweet potato slips from a grocery store.

When he dug the crop in October he found that this one bush plant had produced almost twice as many good, high-quality potatoes as vine-type hills.

So he kept the bush potatoes separate, and bedded them next spring. Nearly all reverted to the vine type. But he "rogued" or or weeded out all but the bushes, and in 1938 only about half were vines. Thereafter only an occasional vine showed up. Now he gets nothing but bushes.

In Texas Experiment Station tests, Murff's Texas 51 has outyielded other varieties 50% to 100%; returned a more uniform crop (fewer jumbos, strings and culls); produced non-stringy high-quality meat; simplified harvesting (no trailing vines to clog harvester, and if vines are saved for feed, they can be cut with a mower).

Last year the new variety yielded 414 bushels, with only 200 pounds per acre of plant food. Other varieties need 600 to 1,000 pounds per acre.

Hogs a Bigger Market for Forage

Condensed from Successful Farming

Maurice E. Heath

IN THE conventional Cornbelt tradition, hogs have meant corn, and corn has spelled soil depletion and erosion. The more rolling the land, the more critical the problem.

Don Frakes, Wright County, Iowa, has experimented with hogs and forages on his own farm, which is Class I land. Observations have led Frakes to the conclusion that conservation and improvement of our soil resources are intimately associated with the management and feeding program of livestock.

The feed consumed by hogs on a national basis shows that only 5 percent of their feed nutrients comes from forages and 95 percent from grains. That wouldn't indicate that hogs could rate very high as consumers of pasturage and hay.

Because of the acute hog soil problem, Frakes started to emphasize quality forages in his 1947 fall pig enterprise. He began with the brood sows just before pregnancy. His purpose was to find the value of large quantities of high-quality forage in hog production and the consequent saving of grains.

Any accomplishment in this direction would help develop a better soil fertility and land-use program, with larger ratios of sod crops to row crops.

On April 15, 1947, 51 head of Duroc-Chester White crossed gilts were sorted from the 1946 fall pigs. The gilts were divided into 3 pens of 17 head each. Their ration before sorting consisted of shelled corn, protein, and mineral —all self-fed.

After sorting, the gilts were taken off corn and protein and put on a half feed of oats for four days. By April 23, the oats were increased to a full feed. The gilts also were put on a half feed of protein, and this was increased to a full feed by April 25 (2 pounds per head daily).

The boars, including a Minnesota No. 1, Duroc, and Poland China, were turned in April 25. On May 15, the gilts were taken to high-quality red clover-timothy pasture. All feed grains were removed from the gilts when they went on pasture until July 5, a period of 51 days.

The meadow has been fertilized with 250 pounds of 0-20-10 per acre at time of seeding. The gilts

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had access to mineral while on pasture, but consumed less than 100 pounds during the entire period of pregnancy. The condition of the gilts during the 51-day grainless period remained excellent, with some gain in weight being observed.

On July 5, Frakes started to feed whole oats of very good quality and protein (45 percent) to the gilts. The oats was increased over a week's time until the gilts were on full feed (self-feeder), and the protein was increased until the gilts consumed 100 pounds daily. This ration continued until a week before farrowing, at which time the protein was cut in half.

Provided with individual pens in a shady grove, 36 gilts farrowed the last week in August and the first week in September. On September 4, the earliest litters were moved into brome-alfalfa pasture. By the end of a 2-week period all 36 litters were on brome-alfalfa.

The remaining 14 gilts farrowed in the same grove about three weeks later. They were run on a red clover-timothy pasture of fair quality. One of the 51 gilts failed to get with pig.

Following farrowing the gilts were self-fed a ration of whole oats, and the pigs were hand-fed hulled oats in creeps. Protein was hand-fed.

On November 11, the 263 pigs farrowed by the 36 gilts were brought in from pasture to the concrete feeding floor. On November 25, the 103 pigs from the 14 sows were put on the feeding floor. These 103 pigs were fed on a limited ration of oats and corn the first 2½ months because of sickness that developed following vaccination. It is believed that the sickness was the result of improper time of vaccinating.

Green, leafy, second-cutting brome-alfalfa hay was fed in the bunk to the large lot of pigs, beginning November 23. It took several days before the pigs became accustomed to the hay and reached their full consumption.

It was observed that at the end of the first four weeks of hay feeding, one manure-spreader load of hay and manure was hauled out from around the bunk. Following this period, there was very little, if any, waste of hay.

By actual weight, the lot of 263 pigs on January 5 were consuming a total of 600 pounds of loose brome-alfalfa hay, and 660 pounds of corn per day. By dry weight, the ration was nearly 50 percent brome-alfalfa hay. Loose hay is preferred to chopped hay because of the need for additional chewing, which Frakes believes is a desirable aid to digestion.

On January 5, Frakes weighed and marked 10 representative pigs. They averaged 128 pounds.

One month later, the same 10 pigs again were weighed, averaging 152 pounds. This was a net

gain of 24 pounds, giving a daily average of eight-tenths of a pound per head.

The brome-alfalfa hay was fed in a regular calf-feeding hay bunk, with a 6″ opening at the bottom to accommodate the pigs. The feed rack was 4′ wide, 2½′ high, and 14′ long.

On February 5, it was observed that the pigs were not able to get all of the brome-alfalfa hay from the bunk that they desired, because the opening was not sufficiently large. After the bottom opening was increased to 10″, the total consumption per day of loose hay increased 35 percent.

It was necessary to ration the corn to make the pigs eat large quantities of hay. However, there was only one period of about a week when the appearance of these hogs looked a bit dubious, as indicated by the roughness of their hair. When the grain-to-hay ratio was increased a little, the roughness of hair soon disappeared.

The original plan of the hog-feeding program was to feed a large ratio of brome-alfalfa hay to corn, and finish the hogs for the July market. However, the supply of hay ran out on June 7, making it necessary to start full feeding of corn.

The 150 head, averaging 246 pounds, were marketed on June 15, and they had received only one week of self-fed corn. In other words, the bulk of the feeding period of this lot of pigs had a very large ratio of brome-alfalfa hay to grain. It was observed that the 220 head ate 400 bushels of corn the first week on full feed after running out of brome-alfalfa hay.

It should be noted that the last lot of hogs, 70 head, ate a total of 1,100 bushels of corn from June 15 until marketed on July 16. This was nearly a fourth of the total of 4,605 bushels of corn consumed by the 349 head raised and marketed (the 52 gilts saved were not marketed). There was a death loss of 17 head.

Up until June 7, at which time Frakes ran out of hay, approximately 82,793 pounds of pork were produced. By this time the hogs had consumed 3,105 bushels of corn, 590 bushels of oats, and 111,550 pounds of brome-alfalfa hay.

The county extension director, Aaron Bowman, the local veterinarian, Dr. B. E. McCulloch, and I periodically observed the feeding project.

Frakes states, "In studying what I believe to be the No. 1 soil-conservation problem in the Cornbelt, namely that of corn and hogs, and in trying to use and evaluate greater quantities of forages in my own hog-production operations the past year, I would like to present the following conclusions and suggestions:

(1) Large quantities of high-quality brome-alfalfa pasture and hay can be substituted for grain *if sufficient time* is allowed for the feeding period. On a dry-weight basis, 26.4 percent of the total feed given the 339 fall pigs to market weight was brome-alfalfa hay. This did not include the fall pasture. Had additional hay been available, the percentage of forage would be considerably higher.

(2) The health and vigor of the pigs receiving large quantities of quality hay to grain appeared very good to excellent, and gains were constant.

(3) With large quantities of high-quality forages to grain, it gives the hog more of a soil conserving and improving relationship to the land.

(4) It was found that sows being carried for first or second litters can use from 80 to 95 percent of the total feed intake from high-quality forage pasture during pregnancy with excellent results. The sows continued to gain while on pasture. My future plans call for grass silage during the winter feeding period.

(5) Even with 26.4 percent of the feed coming from forage, it is not sufficient to set up the necessary sod crops to grain crops to maintain fertility."

The following formal research in hog production as related to land-use is suggested for the Corn-belt Agricultural Experiment Stations:

(a) Determine upper limits of high-quality forage utilization in hog production when *time* is not a factor.

(b) Develop strains and species of grasses and legumes that are more palatable to hogs. Compare various combinations of grasses and legumes for pasture, hay, and grass silage to obtain maximum gains from these forages thru hogs.

(c) Determine at what ages growing and fattening pigs can use quality forage most efficiently.

(d) Select and breed strains of hogs that are efficient foragers.

(e) Determine several practical alternate hog-feeding programs where large ratios of forages to grains are fed or can be fed.

(f) Determine the ratio of hogs to supplemental livestock (dairy, beef cows, and sheep) needed to follow a crop rotation on Classes I, II, III, and IV land that would maintain and conserve fertility when hogs are the major enterprise.

Mr. Frakes does not believe that corn will lose its place as the major crop used for hog feed in Iowa. However, he does contend that a closer balance between sod crops and grain crops must be brought about. This will create a better land-use program for the hog producer.

By the use of more sod crops, larger yields of grain can be ob-

tained per acre. This type of hog management also can help the hog producer stretch his feed supplie during the lean years.

How Handy Can a Farmstead Be?

Condensed from the Missouri Ruralist

Cordell Tindall

Do you still have a "horse and buggy" farmstead arrangement in this age of farm trucks and tractors? Maybe you have brought your farmstead up-to date, but many farmers haven't. Can you drive to your garage, your granary, your machine shed without opening any gates? Can trucks get to your loading chute, if you have one, in bad weather? How many times do you have to get down from the tractor to open gates on the way to your fields? And also get down to close them?

Altho you have a modern farm home with lights, running water and furnace; an automatic water supply in the livestock barn, a corps of farm tractors, a handy truck, and a shed full of power tools, you still can have an out-of-date farmstead.

Times certainly have changed on the farm. The tractor and the truck have taken over the duties of horses and mules. The tractor does the work in the field. The truck makes the trip to town and to market; it has replaced the wagon. When it took a couple of hours or more to go to town in a wagon, that extra couple of minutes to open a gate probably didn't bother you much. And there was plenty of time to get to the fields; usually there was someone along to open gates, anyway.

Then the most important building on the farm was the barn. The barn was the hub of activity, the starting point for before-dawn activity, and the last place to leave at night as the team was unharnessed.

Not so any more. The garage and the machine shed are the headquarters in this mechanized era of farming. Nearby are the fuels and the oils that keep the machines roaring. Here is the repair and maintenance center. The shop is today's "catchall," not the harness room.

Reprinted by permission from the Missouri Ruralist, Topeka, Kansas, Feb. 12, 1949

Now, which is the handiest spot in your farmstead, the barn or the machine shed? That's a simple test to see whether your farm is keeping in step with progress.

Farmstead arrangement, the modern way, is now attracting more interest among Missouri farmers than ever before. In our recent visits to district Balanced Farming contest winners, we found many examples of rearrangement of farmsteads for more convenience. The Balanced Farming associations or "rings" are stressing this point. Agricultural Extension specialists are emphasizing simple rules in farmstead arrangement.

These experts, with actual farm experience to guide them, have worked out a basic arrangment for farm buildings that is so simple it can fit any farm—and it works! It's the "service court" idea. A service court is the area between the various buildings of the farmstead. In a model service court you can enter from the road or highway without opening gates, and then you can easily reach any building on the farmstead.

And why not? Most products and supplies that are transported to and from the farm travel by truck, whether it be a farm truck or a "service" truck. When feed is brought to the farm, why shouldn't you drive right up to the feed-storage room, whether it be for poultry, dairy, hogs, or cattle? The same is true for fertilizer, fencing, lumber, and all the other items that are used on the farm.

The things that leave your farm go by truck, too. Livestock is by far the biggest product of Missouri farms. A sturdy, easy-to-reach loading chute on an all-weather drive isn't just a convenience. It allows you to market your livestock any time when you think the market is right. Of what value is an all-weather road to your farm if trucks can't move about in your farmstead? And good facilities on the farm may mean better service from your trucker, too. He'll be quicker to pick up your animals when he knows that he will not get stuck loading in a ditch.

As we consider the role trucks play in farming operations, the pattern for a modern farmstead becomes plainer—first an all-weather drive, with turn-around space, second, easy access to every building on the farmstead by truck.

The surprising thing about all this is the fact that you probably can have this modern arrangement by rebuilding a few fences and lots. The arrangement of the buildings is not nearly so important as the location of the fences. It's quite a job moving buildings anyway. However, when new buildings are constructed they can be located in more convenient

spots.

When it comes to the plan of the farmstead every case is different. A farmstead that we think is as nearly a model as any we have seen in Missouri is the farmstead of Mr. and Mrs. Mitchell Kincaid, near Norborne in Caroll county. All buildings are new, which largely accounts for the modern planning used.

The home faces east, and is set in a nice-size lawn which is fenced. The entrance to the farmstead is a tree-lined drive on the south side of the lawn. This pleasant drive, well-surfaced and wide enough for trucks and machinery, leads to the large service court. Occupying the most prominent area of this court is a combination machinery shed and garage, with a shop inside. This is THE BUILDING of the farmstead. It faces south with big, wide, rolling doors. It serves to house the farm truck, the family car, machinery, and fertilizer and it is easily reached—no narrow driveways, no neck-craning when you back out.

Also facing on to the service court are the poultry yard, granary, and several storage buildings. The barn, which is the center of the livestock enterprise on the Kincaid farm; does not directly join the service court. Rather it is set in a lot which leads to the service court. There's one gate between barn and service court.

Alongside the barn is a good loading chute. The barn lot and feeding area has a good slope, for river bottom land, and is sandy. therefore it never gets very muddy.

In the Kincaid farm we have an example of all buildings of a farmstead being built new and put in convenient locations. Similar results can often be had by changing fences.

Legume Hay Licks Cobalt Trouble

If you live in a cobalt-deficient area, you'll have less trouble with your cows by feeding them legume hay.

New York scientists say that cows will get enough cobalt if their hay is made up of at least 50% legumes.

Another easy way to correct cobalt deficiencies is to mix an ounce of cobalt with every 100 pounds of salt.

—Farm Journal

Strip Cropping Made Easy

Condensed from Soil Conservation

Dr. John P. Jones and James M. Wise
Soil Conservation Service

IN THE Northumberland Soil Conservation District, Sunbury, Pa., contour strip cropping is regarded by technicians as easy to install and by farmers as indispensable for erosion control. While such items as contour plowing and cultivation with short rows in the middle were once regarded as obstacles, today they are accepted as essential to the success of strip cropping.

Here are a few reasons for the success of strip cropping in the Northumberland District.

Boundary lines for contour strips are laid out nearly as fast as a man walks. One man with abney level and stakes takes the lead and a second man, generally the farmer or a person not so experienced with contour lines, follows along, from stake to stake, and serves as a stadia rod or sighting point. After setting the first stake, additional stakes are placed in the contour line by sighting back on the last stake. Experience has made it possible for a man to walk a contour line very closely, and it is usually necessary to move up or down the slope only a step or two to place a stake on the level or contour. By this method the cumbersome use of a tape measure to lay out parallel-sided strips is eliminated.

After the first line is run, a second line is run back across the field and so on until the whole field is completed. Two men lay out and plow in contour strip boundaries on 60 to 70 acres with about as much ease as 25 to 30 acres of parallel-sided strips.

Contour lines for strip boundaries are run through standing corn and other crops. This is nearly impossible with parallel-sided strips because a tape cannot be dragged over a growing crop to establish the lines. With the contour method it is, therefore, possible to spread the work over a longer period each year and utilize technical time more efficiently.

In the Northumberland District the width of strip is largely regulated by the contour boundaries. By following contour lines, strips generally narrow to 70 to 90 feet on the steep slopes and widen to 125 feet on the more gentle slopes. To keep strips from being too nar-

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row at any point, judgment must be used in starting a contour line. Experience shows that the strips must be at least 60 feet wide or the farmer may get into trouble turning his equipment.

At first local farmers seemed to think that strip cropping was multiplying the number of short rows to which they had been accustomed. To avoid short rows, a few even went so far as to insist on parallel-sided strips. In these cases they found correction strips a worse evil than the short rows, and that erosion was not controlled. When they changed to contour strips with both edges on the contour, they found to their surprise that the number of short rows was scarcely any more than they had become accustomed to in the old square field system of farming. They also found that strips with both edges on the contour did a better job of erosion control.

Short rows in the middle are an obstacle only in the case of potatoes where the ridge row method of cultivation is used. Ridge rows make turning of spraying equipment difficult. Where parallel-sided strips are used, highly ridged rows prevent water from breaking through and causing gullies. Management of the correction areas is often a problem. Sometimes they can be managed by planting potatoes with short rows on the side, but often it is necessary to leave those areas in hay. Some farmers have used strips with both edges on the contour by planting the potatoes in the long rows on each side of the strip and planting the point row area in the middle to corn or truck crops.

Diversion terraces, sod waterways, and rotations are used to supplement strip cropping. Diversion terraces are confined to steeper cultivated fields. Rotations are of the common dairy type with more hay and pasture on steep slopes and more grain on gentle slope, where needed. Natural waterways are carefully maintained in sod.

The art of plowing, planting, cultivating, and harvesting contour strips has been worked out by the Northumberland County farmers with advice of the farm planner. Starting on the strip boundaries and plowing to the center is alternated with starting in the middle with the point rows as a guide and plowing toward the outside. By this plan the turning of the land toward the outside one time and toward the center another, prevents any significant movement of soil or any abnormal unevenness of the surface.

Planting, cultivating, and harvesting are always started on the outside and contoured toward the center. In all these operations the short rows create somewhat of a problem, but farmers after a little

experience can handle them, even when using such large equipment as the combine and two-row corn picker. In seeding operations, it is necessary to do a little overlapping at the point to avoid skipping some of the area enclosed. In cultivating corn with a tractor, turning is done at the end of the point rows in the middle of the field almost as easily as at the ends, with little or no damage to the crop. The tractor operator has no difficulty learning how to do this. With short rows in the middle the farmer can harvest corn with a corn picker more easily than when they are on the side.

Contour strip cropping has been reduced to simple terms. As a result, it is making headway on a large number of farms.

A 10-Second Moisture Test

Want to know whether your grain is dry enough to keep in the bin? It will be easy to find out when S. T. Dexter's new quickie chemicals are on the market. One changes gradually from almost white to a deep red as moisture content of grain samples progresses thru the range of 8 to 12 per cent. The other measures moisture content in the range of 12 per cent up to 16 per cent. At 12 per cent it is almost white. The color deepens as moisture increases until at 16 per cent or higher it is a deep blue.

A small quantity of one of the chemicals is poured into a glass container, which then is filled a third full of grain, closed tightly, and shaken 5 to 10 seconds. Dexter, agronomist at the state experiment station at East Lansing, Michigan, has worked out a color chart to be used in making readings. To get the answer, the chemical in the container is matched with a spot of the same shade on the chart.

Advantages of the new method are: 1—It is quick; 2—cost is low; 3—it is highly accurate, and 4—no difficult computations are needed to obtain readings.

The new materials may be put to uses other than testing grain. The red one will tell when flooring is dry enough to lay. The blue can be employed to show whether hay will keep in bale or stack, or whether tobacco has the right moisture content for use as filler.

Patent applications have been assigned to Michigan State College and the materials soon should be available.

—Capper's Farmer

Drudgery Minimized by Barn Cleaners

Condensed from Northwest Farm Equipment Journal

Ask any dairy farmer: What's the toughest job to do in your business?

With modern milking machines, milking is made easy. With conveyors and other hay and feed handling equipment, feeding is no longer a big problem.

Chances are the dairy farmer will tell you he spends two or more hours a day at cleaning chores—hours that could be spent profitably in the fields.

Great strides have been made during the past few years in taking the back-breaking drudgery of sweeping and shoveling out of dairy farming. Keeping milch cows is still a seven-days-a-week job, but the implement dealer can help his customers to shorter hours with modern barn cleaning equipment.

Too many farmers feel that barn cleaners are luxuries only for the large-scale dairyman. Some of them are intricate, high priced and economical only for the dairyman who has, perhaps, 100 or more cows.

But recently some companies have devised cleaners in the $500-or-less price range for the medium to small farm. Officials claim these can be used economically when the farmer has only 20 to 30 cows in his herd.

Take for instance, the Cub Crown Barn Cleaner put out by the Crown Farm Equipment division of the Marathon Foundary and Machine Co., Wausau, Wis. This cleaner is of the endless chain type, complete with an 18 foot elevator.

Installation is simple, the company says. Corner idlers have been redesigned for easy, accurate installation. Engineers, too, point to the new Cub transmission mount. It's universal and designed to fit every barn. No gutter rail is needed with the new light-weight chain and steel paddles.

With the push of an electric button, the modern farmer can cut his hired labor costs and clean his barn in a matter of minutes with only a few cents worth of electricity. This is the claim of the American Conveyor Co., Chicago, Ill., manufacturers of the "Barnveyor."

This all-metal barn cleaner, too, can be installed in any type or size barn. Its endless chain carries manure and barn litter from the floor gutter to the elevator and

Reprinted by permission from Northwest Farm Equipment Journal,
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then loads it directly into the manure spreader.

The Barn-veyor's driving unit has Cone-Drive gearing, used during the war for aircraft, tanks and battle-ships. It is completely housed to prevent entrance of ever-present barnyard dirt and to provide sealed-in lubrication. Excessive wearing of mechanical parts by abrasive soil grit—a big problem in farm machinery—is eliminated by the Cone-Drive geared reducer, the manufacturer says.

To assure cleanliness and long life of the equipment, the chain and conveyor flights pass through a solution which both lubricates and disinfects them before returning to the barn.

Normally this cleaner uses a specially designed one-horsepower motor, but special phase or cycle motors are available for installations requiring them.

Bennett-Ireland, Inc., Norwich, N. Y., recently announced production of a new gutter cleaner featuring straight-line pull direct from gutter to spreader. It is available for single and double gutter installations.

No "pit" or corner constructions or special sheds are necessary in installing the Ireland gutter cleaner. There is a cover over the reel mechanism and motor, making a shed unnecessary.

Adequate power is provided for quick cleaning of a full load once a day, the manufacturer said. Hoof injuries are prevented by special "safety design" steel scrapers. Chute covers prevent rain and snow from running back into the gutter.

This cleaner comes complete except for wiring to the single motor, a base for the elevator units and a sanitary pipe-cover for the overhead return pull cable.

Farmers can cut their chore time by two hours a day with the combined use of the Hedlund barn cleaner and hay hoist, say officials of the Hedlund Manufacturing Co., Boyceville, Wis.

The Hedlund cleaner will clear barn gutters up to 80 feet in five minutes or less, where hand shoveling would take at least an hour, and users say gutters are cleaner than when shoveled by hand. When fully loaded the cleaner has a squeegee effect, which leaves the gutter dry and clean.

The tough steel apron is manufactured to fit the barn's gutter. Lying in the gutter, the apron goes out sliding and comes back 20 to 24 inches above.

A Hedlund hay hoist can be used to power the barn cleaner and is operated by a single rope which engages the clutch and also the motor switch. If the hay hoist is not required, the firm can sup-

ply an even more compact power unit.

In order to use this machine, you must be able to run the "delivery chute" straight out from the end of the gutter through the wall. The ground elevation at that end and out 15 to 25 feet should not be much higher than the bottom of the gutter, and lower elevation is preferable so the chute can be raised enough to drive the manure spreader under it.

Hedlund elevator chutes are built in several types to fit the barn and other requirements. The stationary type is held up with posts and can be moved at haying time if necessary. The skid type is built on skids so it can be slid away from the barn if necessary. There is also a portable type with wheels and a track that can be extended the full length of the barn and used for any number of gutters.

"Oldest successful barn cleaner" is the claim of the Eau Claire Equipment Co., Eau Claire, Wis., makers of the Sanitary Barn Cleaner. It is more than 40 years old.

With this cleaner, the litter is carried to the end of the barn by twisted cleats riveted to two heavy chains and out of the barn through an opening about 16 inches high. Barn doors may be kept closed during cleaning operations. As the conveyor chain passes out of the barn, it is conveyed on an incline to the spreader.

Patented revolving forks at the rear of the machine hold the conveyor chain down at the end of the gutter, preventing a lift in the chain as it enters the inclined conveyor and helping to move the litter outside.

A pull back machine returns the conveyor to the gutter after the barn has been cleaned. Both floor and ceiling pull back machines are made, but the ceiling type is most popular because it is not in the way.

The Sanitary's main power unit is enclosed in the motor housing, which eliminates gearboxes, V-belts and chains.

Eau Claire also offers an immovable straight machine eight feet long for use where the barn is built on a hillside or where there is a minimum of six feet from the gutter bottom to the ground level.

Marathon Foundry and Machine Co. of Wausau also puts out the Crown "push button" barn cleaner, which cleans both gutters at the same time, carrying manure and liquids directly to a spreader or pit.

Specially-designed paddles are a feature of the Crown cleaners. The paddles sweep the gutters clean.

Marathon boasts three basic models—the 80, designed for the small dairy barn for from 20 to 30

cows. Model 100, the standard unit, is designed for larger dairy barns up to 150 feet long and housing 100 cows.

Largest in the line is the Model 100X. Equipped with a super-heavy-duty transmission, it will easily clean dairy barns more than 250 feet long and housing 200 cows.

Elevator-conveyors are available from the Crown division for all installations requiring raising manure into the spreader.

J. W. Baehr, farm equipment manager for the Eagle Manufacturing Co., Appleton, Wis., designed the Eagle barn cleaner.

Operated electrically, it has a conveyor system of an endless chain and endless trough. Angle irons and flights of gutter width move the litter to a discharge point, where a separate conveying unit carries the litter to a waiting spreader.

All liquids are removed by the elevating equipment and the installation is leak-proof, the company says. The all-steel elevator is wiped dry by wooden flights a few minutes after the litter is removed.

Engineers at Eagle estimate that the cleaner saves some 400 hours of labor during a normal year. Cost is about 30 cents a month for electricity.

Any gutter width or length can be fitted with the Jamesway barn cleaner, manufactured at Fort Atkinson, Wis. No cross gutters are required at either end of the barn. When not in operation, paddles fold back out of the way.

The mechanism located in the gutter has no drag chains, endless chains or sprockets. The drive chain is of the heavy roller type and chain and sprockets are completely protected by a heavy-gauge steel housing. The gutter bar is of high carbon steel tube. Paddles are malleable iron.

Each length of gutter bar is 18 feet, making a minimum of joints. This cleaner can be installed to operate at either end of the barn.

A weatherproof hinged hood completely protects the drive motor and reduction unit.

As the paddles move down the gutters with the Jamesway cleaner, they are vertical to the sides, pushing manure straight ahead. On the return trip, hinges permit them to lie flat against the side, by-passing manure still remaining in the gutter.

Representatives in the vast field of barn equipment, through engineering and education, are striving to improve the business of dairying.

Farmers everywhere are watching these developments with growing interest.

Reduce Silage Losses

Condensed from Ohio Farm and Home Research

Charles F. Rogers

SILAGES form by fermentation changes in the absence of air. They are good or poor as the result of the total conditions within the silo when the fermentation begins. They spoil thereafter from one or the other of two causes: 1) heating, molding, and then decaying; 2) accumulation of drainage juices.

Why Silages Spoil. When air gets to moist crops stored in silos, the mass heats, molds, and then decays if air continues to get in. This is the commonest and largest source of feed loss in silos. Air gets to the silage through the topfill, or to a less extent through the doorways in improperly fitted or sealed doors. The spoilage from heating and molding is preventable by exclusion of air.

When drainage juices accumulate in the bottom of a silo filled with cold, wet, or young material there will be a layer of poor feeding quality that is neither molded nor decayed, but because of its low quality it is also considered spoilage. Proper drains and liberal use of added conditioners to crops in this condition will help reduce the spoilage resulting from too much moisture and too low a fermentation temperature.

Ways to Reduce Spoilage. The simplest way to reduce spoilage is to tramp the topfill (top three doors) until there is a "cork" of uniform, evenly compacted crop made especially firm at the wall. After filling, additional tramping immediately until no more settling is evident will prepare the surface for other treatments or keep it in good condition for repeated trampings at 12-hour intervals as long as the treading shows settlement on the surface. Sprinkling with water to keep the surface cool, moist, and heavy will be helpful.

There are reports from various reputable sources concerning chemical treatments of silage surfaces to reduce spoilage. Their general usefulness for everyone remains to be established. If safe, cheap, and easily applied, they would seem to be preferable to other means of controlling spoilage.

Moisture-air barriers of some material put on silage surfaces are really an extension and completion of the silo structure. Water-

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repellent papers have been in use for years with varying success. To be most effective they must lie flat on a well conditioned top surface and make close contact with the wall. All laps must be tight. In tower silos such papers seem to work better under a roof than when fully exposed to the weather.

Successful use of paper takes time and skill. Paper weights could be limestone or boards or some additional crop. The limestone and boards would have to be pulled up. Usually it is necessary to handle the crop materials twice to cover the paper but when the blower is available it is easiest to send them up after the paper is in place. The fact that many farmers have used papers for years indicates its usefulness to them.

Use of a flexible cup to hold a layer of water on the silo topfill, distribute a weight over the surface, and seal air away from the walls is an old idea tried out in various places with success when the cup was in vertical contact with the silo walls, when it held water, and when it lasted out the season. All early ones were expensive to make because of material and labor costs, and waterproofing requirements. Synthetic plastics have changed this picture.

In July 1947, after inquiry from the Experiment Station, The B. F. Goodrich Company of Akron, Ohio, made available two plastic cups with air-inflated rims. Installed on grass silage in 8-foot silos, they so greatly reduced the top spoilage that tests were started on 24 pairs of silos on farms in Wayne, Stark, Medina, and Portage Counties.

Installation of the Cups in these Tests. Farmers were selected to cooperate if they had two silos to be filled in quick succession with corn from the same field, and if they found the idea of the cup interesting. The cup went on one silo as soon as possible after filling, and the treatment of the other silo to check the performance of the cup was the responsibility of the farm operator. The cups went on the conditioned topfill as little as 30 minutes and as much as 120 hours after filling stopped, depending on conditions in the silo and the experimenter's schedule. Before placing the cup the top surface was slightly crowned with a shallow or steep ditch at the wall. Soft spots were compacted as as much as possible and hollows filled. Water was then pumped into the cup until there was a band of contact between cup and silo at least 6 inches high all around. Inasmuch as the details of cup design changed from time to time, details of installation and handling changed with the design.

It was found that to be effective the cup must not only cover the surface but must have enough ver-

tical contact with the silo wall to keep air from going down the wall where most of the top spoilage normally develops.

Some cups were removed after 4 weeks; others stayed on longer, one for 47 weeks. Time for spoilage of the surfaces of the check silages ranged from 2 to 16 weeks.

Results. In all but one of the 1947 installations the check silage showed much more spoilage than the paired silage under the cup, no matter which was observed first. Under all cups so far observed there has been a cold, wet ring of strangely tasteless but undecayed material, where the cup, the silo, and the silage meet. This ring is like that found below the level of hot spoilage at the bottom of the crack between silo and silage in unprotected top surfaces.

Delay in installation of the cup permitted heating, caused mold to begin to grow, and in all cases reduced the apparent and real effectiveness of the cup. Only in those cases where such delay in installation occurred, or where the band of contact was too narrow, or because of slippage of the cup due to uneven settling, did molds develop under the cup.

The single exception to the trend shown in the data resulted from an improperly filled 10-foot silo, which was the "cup" of Pair B. At the end of the 64 days shown, spoilage at the doorway proved deep and soft, and the cup was replaced with only a little water to keep the seal. In the 83 days between the first observation and the opening for use, the cup had drawn far down into the cavity caused by the decay and shrinkage of the fluffy parts of the silage which had accumulated by the door. Adding the real spoilage to the 632 pounds of rejected material, gives a weight of 8,467 pounds of waste from under a cup in 147 days.

This example emphasizes the fact that for efficient use of silos the filling, from the bottom right on up, must be properly done. No amount of work on the refill or topfill can correct gross underlying faults.

Results obtained on typical pairs of test silos:

	Pair A	
	cup	check
Time in days	55	62
Weight of spoilage removed	1,560	3,860
Dry weight removed	264	1,068
	Pair B	
	cup	check
Time in days	64	43
Weight of spoilage removed	632*	2,965
Dry weight removed	115	507
	Pair C	
	cup	check
Time in days	52	43
Weight of spoilage removed	279*	1,629
Dry weight removed	34	327
	Pair D	
	cup	check
Time in days	34	34
Weight of spoilage removed	179†	1,719
Dry weight removed	33	475

* Beef cows ate these rejects.
† Young dairy stock ate willingly.

Management of Grasslands

Condensed from the Kentucky Farmer

W. C. Templeton, Jr.

SECURING a good stand of grass and legumes is less than half the problem in successful grassland farming. Of equal or greater significance are management, harvesting, storage and utilization of the forage produced.

Management refers to the way grasslands are handled and the treatment given them. Good pastures and meadows don't just happen and many acres of grassland give low returns every year due to mismanagement. Seeding and establishment are expensive and it behooves the grassland farmer to do the best possible job of management.

Young seedlings are tender and weak. Do not graze them until they are well established. Never allow stock to graze new pastures during wet, rainy periods. Soil trampled when wet is puddled or "run together," there are holes where the animals step and the ground is rough and uneven. Remember—the first three or four months are the most critical for pasture plants. Once established, they will take much rough treatment.

After the grasses and legumes are established and where the soil fertility needs have been met, relatively close grazing is preferable. It has been found that weeds are worse in undergrazed pastures than in closely grazed ones and the production of milk or beef per acre is less when undergrazed. Overgrazing is, of course, detrimental and especially so during late fall. Pasture and hay plants should be allowed to make considerable growth during late fall so ample food materials may be manufactured and stored in the roots and crowns. The plants require stored food during the winter and for early spring growth.

Reseeding of thin areas in pastures and meadows is usually beneficial but results may be disappointing if fertilizer or manure is not added. Often, low soil fertility is responsible for the thin spots. Such areas should have fertilizer or manure applied, be disced lightly and reseeded to a mixture of grasses and legumes.

Fertilization of grasslands low in fertility is beneficial for several reasons:

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1. The total yield of forage is increased.

2. The chemical composition and feeding value of the forage are improved.

3. More economical production is obtained.

4. Soil fertility is maintained or increased.

5 There is less soil erosion.

Some of the most outstanding pasture improvement studies in the United States have been made at the Western Kentucky Agricultural Experiment Substation near Princeton, Kentucky. The results of those studies are of great significance and value to everyone interested in grassland farming. A twelve-year summary of the results obtained from different soil treatments as reported in Kentucky Agricultural Experiment Station Circular 52 is given in Table I.

Through the use of rock phosphate alone an additional 1,179 pounds of beef was produced each year on ten acres at a total increased cost of only $2.44 while superphosphate and lime gave a yearly increase of 1,144 pounds at a cost of $2.96! Another significant finding was the fact that at the end of twelve years the sod on the treated fields was much thicker and protected the soil from erosion whereas the untreated field had only a thin, weedy sod which permitted erosion between terraces.

A few years ago the National Fertilizer Association studied the results of many fertilizer experiments throughout the country. Some of their findings are summarized in Table II.

Surely data such as these point the way to a more profitable farm program. Though increased production as phenomenal as this may not be obtained in all instances, there can be no doubt that the fertilization of poor, rundown pastures pays large dividends. Yet, it is estimated that less than eight per cent of our grassland acreage is fertilized.

In grassland farming as in row crops weeds are usually a problem though when ample, high quality seed is used, the seed bed is well prepared and fertilizer applied, the weed problem is much less serious. Nine times out of ten weedy pastures need fertilization. On soils which are not fertile enough to support the grasses and legumes desired, weeds which can grow on the poorer soils come into the mixture and eventually crowd out the good plants. As a weedy pasture is almost always a good sign that something is lacking in the soil, the first thing to do is apply needed fertilizer. Broadcast applications in early spring are recommended.

Judicious use of the mowing machine is extremely helpful in controlling weeds. It is very important that mowing be done before the weeds have many blooms and seed are produced. There are several chemical weed killers available, but 2, 4-D is, by far, the best known and most useful. It can sometimes be used to advantage in pasture and hay crops. A broadcast application may be made with power equipment where there are no clover or other legumes or it may be used to advantage as a spot-treatment of individual plants or clumps of weeds even in grass-legume mixtures. Recommendations of the manufacturer should be followed carefully. 2, 4-D is not poisonous to livestock.

TABLE I

Soil Treatment	Ave. No. Steers Per 10-acre Field	Ave. Yearly Gain Per 10-acre Field	Ave. Cost Per Pound of Gain
None	2.6	461 lbs. beef	10.5 cents
Rock Phosphate ...	6.4	1640 lbs. beef	3.1 cents
Limestone and Superphosphate .	6.7	1605 lbs. beef	3.2 cents

TABLE II

Increased Milk and Beef Which May Be Expected from the Use of One Ton of Commercial Fertilizer Applied to Grasslands

Source of Data	Increase in Milk	Increase in Beef
26 State Pasture Experiments	11,500 pounds	1400 pounds
44 Hay Fertilization Experiments ...	6,400 pounds	770 pounds
Tifton, Georgia, Pasture	.....	960 pounds
Southern Ohio	8,600 pounds	1076 pounds

Test Your Own Sows

Condensed from Breeders Gazette

Harold Boucher

EFFICIENT production of a high quality product is the key to the hogman's profits, whether he be a market hog raiser or a purebred breeder. Unfortunately, the swine industry's past methods of determining both efficiency and quality have been based too much on opinion rather than on factual information.

The two problems of performance and quality product go together. Rapid gains mean cheap gains; but if we breed, feed and select continuously for rapid gains without consideration for the end product, we may soon have a hog type loaded with lard. The surplus of that product can become such a price-depressing factor that the total value of the hog is lowered more than the gains from economy of production. This is possible even with today's unfair system of buying hogs. We must also remember that it hasn't been proven as yet that the heavy fat-producing hog is the most economical gainer.

These problems of performance and quality have been kept in confusion by the hog raisers' failure to keep feed costs records, litter records and weight records; by an antiquated hog-buying system; and by our trying to pick the winners of our barrow shows on looks without some factual means of checking up on our selections of pork on the hoof.

In the early days, the hog grower had more time to exercise his powers of observation. But in today's fast-moving, mechanized and big-scale farm operations the farmer takes little time for observation. Our old methods and tools are no longer adequate. The improved purebred hogs we have can do the job, but we must use the new tools and methods of measuring results. We cannot continue to guess and breed for improvement on unmeasureable factors; today we have definite and practical means of measuring both productivity and value of that product.

Performance involves several things. Prolificacy, or big litters of strong pigs farrowed and raised, is a must to the hog raiser whether of purebreds, grades or crossbreds. Next in importance is rate and economy of gains. These factors can and are being measured in many purebred herds today

Reprinted by permission from the Breeders Gazette,
Spencer, Indiana, February, 1949

through the official Production Registry test approved by the National Ass'n of Swine Records. The PR test is simple and practical, and any hog grower can use the records obtained.

It has been definitely established by our experiment stations that weaning weight is a reliable index of how fast a litter will grow and how much pork that litter will eventually put on the market. By weighing our litters at weaning time we learn what can be expected at 6 months. This is the key to the PR test, although we obtain still other valuable information for use in selecting sows and gilts for the herd.

In purebred herds where seed stock is sold, some kind of supervision is necessary for the records to be official and have maximum value to buyers. Although Production Registry is sponsored by the various breed associations and only purebred animals are eligible to compete under official supervision, anyone can carry out the test and make use of the records obtained.

The PR test simply calls for *earmarking* of each litter at farrowing time and *weighing* of each litter when 56 days old. To permit litters to be weighed conveniently, weaning weights may be taken at any time between 50 and 60 days of age. To put them on a 56-day basis, we use a conversion factor worked out by the Regional Swine Breeding Laboratory at Ames, Iowa.

Good use of PR records does not mean that only those pigs from qualifying litters can be kept for breeding purposes. Some of our most productive sows may be those whose litters almost qualify during one particular farrowing season and the test is just as important to the man who doesn't have any qualifying litters as it is to the man with a high percentage of qualifying litters—it gives him the factual data he needs to learn which sows are his best producers and which sows he should cull out as soon as possible.

To really take advantage of this production proving, all records, good and bad, must be kept and studied. PR records may be used for selecting, culling, advertising and selling, but to get these benefits the herd owner must first keep the records and then make them available to his friends and customers.

Maximum success of the PR test requires that every sow in the herd be tested. Two breed associations, the Hampshire Swine Registry and the Duroc Record Ass'n are today sponsoring an official PR herd test which requires testing all sows farrowing in a herd throughout the year. This herd test is the real thing.

Where the entire herd is tested, every sow in the herd must be accounted for and figured in, good

or bad, to obtain herd averages. With a record on each sow and each litter, real comparisons can be made for selecting replacement sows and gilts. Family strains more or less efficient can be detected, and the siring ability of herdsires can also be determined.

To qualify for PR, gilt litters (under 15 months of age at farrowing) must consist of 8 pigs raised to an official 56-day weight of 275 lbs. Litters from sows over 15 months of age must consist of 8 pigs raised to an official 56-day weight of 320 lbs. To qualify as a "PR sow," a sow must raise two qualifying litters.

Since the inauguration of Production Registry by the Hampshire Swine Registry, over 10,000 litters have been nominated for test. Approximately 3,000 of these have qualified as PR litters. Far too many of the failures were not the fault of the sow raising the litter but rather of the man looking after the sow. Even so, where all the sows in the herd were tested, the records were of immense value even though the litters failed to qualify.

Breeders are planning to list in their sale catalogs the PR records on each litter offered. Think what it will mean to have such information available for your consideration when you attend your next bred sow sale: 11 pigs farrowed, 10 pigs raised, 56-day litter weight 544.94 lbs. Bred to PR boar No. 20 which has 7 daughters that have raised 10 litters to an average 56-day weight of 376.94 lbs.

Official records on 58 Hampshire PR litters show an average of 11.74 pigs farrowed, 10.75 pigs raised to an average 56-day litter weight 544.94 lbs. These are selected records of litters weighing 500 lbs. and over, but they show the importance of litter size to a high total market weight. In none of these litters were less than 9 pigs farrowed. In only four was the minimum of 8 pigs raised.

Hampshire breeders now have 533 official PR sows. These sows have raised 1,296 PR qualifying litters averaging 11.4 pigs farrowed, 9.63 pigs raised to 373.3 lbs. at 56 days of age. Many of these are the first litters of gilts. That's 12,486 Hampshires raised to an official 56-day weight of 38.75 lbs. per pig.

A highly competitive swine enterprise in the future will make it imperative to determine through factual records the most efficient hog and the most valuable carcass, and then to adjust the two for best results. Right now, PR testing of the improved purebred hogs of this nation is leading the way to new progress in swine improvement and to better performance and greater profits on our pork producing farms.

Hamsters—A New Industry

Condensed from Better Farms

Frank L. Grinstead

THE HAMSTER is capturing the fancy of American breeders! Only a few years ago—10 to be exact—the Syrian Golden Hamster made its debut on the American scene. The small rodent came here as a substitute for its slower breeding cousin, the Guinea Pig.

The Hamster, a six-inch, reddish gold mammal, looks like a cross between a mouse and a chipmunk, with almost no tail. Again, it looks like a dwarf bear. Call it what you may, it's probably the cutest animal to hit American shores since the Panda.

Its original home was the arid plains of the Near East. Today, it lives in many nations around the world.

The Hamster has all the habits of our own rodents plus those that made possible its survival. Because it had to make long forages into the desert for food, nature has provided it with pouches along either side of the jaw, where about half its own bulk in food can be carried.

When feeding Hamsters, more food than they need can be put into the cages, as they seem to delight in hoarding food in their nests and eating it later.

After the Hamster has carried all the food to the storage place it will sit up, rub its front feet together, and then rub its face until quite certain dirt or crumbs might be gone.

Hamsters are becoming increasingly useful as laboratory animals, used for medical experiments. Scientists have found that the fast-breeding Hamster reacts to more laboratory tests of human diseases than any other animal. It is more easily cared for and eats less than any other lab animal except the mouse.

Hamsters are greatly susceptible to tuberculosis and react to it in about the same manner and time the human does. It is not wise to feed hamsters milk from untested cows for that reason. They are used in diet tests, and tests in the prevention of tooth decay. Their susceptibility to lung diseases makes them valuable to the cattle industry.

The small, naturally tame and inquisitive Hamsters are gaining great favor as pets. They make good pets for children, for if their feeding time is forgotten now and then they will not suffer but can turn to the food they have stored away. Their cages take up little

Reprinted by permission from Better Farms, Buffalo, N. Y., Feb. 1, 1949

room, and a few cents a day will feed them.

Because of their rapid rate of breeding they are useful to biology students who can witness the complete reproduction cycle in a few weeks. They are also used in the study of heredity.

For people who want to raise Hamsters commercially there is still a large demand for them in most localities. In some areas their usefulness is not known, so must be talked up.

Before you start commercially, a lot of headaches and time and money losses can be prevented if you find your markets first. Look for markets in hospital labs, pet shops, and sales to beginners. You can advertise your surplus stock in magazines and papers.

If you have decided to add the care of a few cages of Hamsters to your daily chores, the next thing to do is choose the breeding stock. Most people start out with a trio, one male and two females. If you have a chance to pick your own stock, choose Hamsters about three to four weeks old; this is the age at which they are weaned. By choosing young stock you will have a chance to study their habits before breeding age and before you have a cage full of little pink, hairless offspring.

Breeding stock can be bought at most pet shops in the larger towns. If they cannot be obtained there you will find advertisements in most farm, pet and sportsmen's magazines. They are not expensive, in most cases selling for $10 or less a pair.

It is unwise to start raising Hamsters on a big scale until you know their care and habits.

If you have any luck at all your trio will soon give you all the Hamsters you can handle.

The location of your pens is of great importance. They should be kept in a building if possible, protected and dry the year around. Garages and basements are good places for pen location.

Hamsters can stand warm weather better than cold. During the cold part of the winter the Hamster, being a semi-hibernating type of animal in the wild state, may show a tendency to hibernate. The domesticated Hamster will not live if allowed to hibernate. If they become too cold they will assume a ball shape and give every appearance of being very sick or dead. However, if they are straightened out from the curled position and mild warmth applied to them, such as a 40-watt light bulb placed near by, they will be moving about in a short time. Warm milk or water given with an eye dropper will also help.

Most breeders prefer cages for their hamsters. A cage should be big enough to give the Hamster a chance to exercise, and should be

made of wire mesh. Each Hamster should be kept in a separate cage after breeding age. A good cage size is 10″ wide, 10″ high, and 15″ long. The floor can be solid metal sheet or wood.

The Hamster eats much the same kind of food as any other rodent: grains, green tops, some roots and fruit. High protein pellets put out for other animals are good Hamster food. A poor diet will lead to cannibalism; a hungry mother will eat her young. Milk, chicken scratch and dry bread are good for variety. Crumbled dog biscuits can be used but not as a steady diet.

There is no need of a feeding bowl as the Hamster likes to hunt around in the straw in the bottom of the cage for his food.

Hamsters should have drinking water in their cages at all times. The use of an automatic water bottle is best.

The pens should be cleaned at least once a week and fresh straw put on the floor.

The Hamster produces much faster than most other rodents. The breeding age for the young is from six to eight weeks old. When the female shows a great deal of restless activity it is her mating time and she should be taken to the male cage. If she accepts service, leave her there 15 minutes, but should she fight the male take her out, as she might injure him, and try her again in the next day.

The gestation period is 16 days. The young are weaned at three weeks but can be left four if the mother will feed them. She should be allowed to rest a week after weaning; then she can be bred again. There are times during the winter months when she shows no interest in breeding.

The Hamster will have seven or eight litters in two years. The size of the litter will vary from four to 15, with eight as a good average.

Some breeders keep a litter together until the females begin to show their size before placing them in separate pens. Hamsters fight among themselves a great deal so this practice is not always wise.

Adult Hamsters are all the same size and color, making the sex hard to determine. The best way to tell the sexes is by the shape of the rump. The male has a bluntly pointed rump that sticks out behind, while that of the female is rounded.

The nest that the Hamster builds out of straw, or what ever else she runs across, is a simply constructed affair into which go babies, food and anything else she finds and decides to keep. You will see a tiny foot sticking out here, a pink head there, but they all seem to turn out well, so you will finally decide mother Hamster knows what she is doing.

Geese Are Profitable

Condensed from American Poultry Journal

George M. Jenkins

YEARS ago, before specialized farming became the rule, geese were found on nearly every farm. They furnished meat, eggs, feathers, quills which were used for pens, and goose grease used for food and medicine. Today the picture has changed.

Although geese are raised throughout the United States, they are limited in numbers and widely scattered. The 1940 census reports that only 1 farm in 10 has geese and they make up only about 1% of the total poultry on farms in the country. What caused the goose to be forgotten?

The reason for the decline in the number of geese kept is not too hard to explain. It is because geese cannot be raised in large numbers on small areas of land, and the trend of agriculture has been toward compact farms and intensive cultivation. At the same time, the chicken has been constantly improved by selection and breeding to gain and fix desirable characteristics. Geese were not given the same attention and began to loose popularity because the improved chickens brought in greater cash returns.

However, the goose does have a definite place in our agricultural system. These fowl require less feed, attention and housing than any other farm animal. Geese live almost entirely from grazing on pasture. They graze closer than any other animal. Thus they are able to get fat of their own free will whenever pasture is good, without any supplementary feeding. From the age of two weeks to maturity, it is possible to raise geese on good pasture without any other feed.

It is impossible to specify the number of birds to keep per acre, but 10 to 20 can safely be allowed. Under excellent pasture conditions greater numbers may be kept. One of the greatest assets of geese is that they are able to utilize pasture and marshy ground which is undesirable for other animals. If pasture of this type borders a pond or stream, so much the better. Despite popular belief, geese do not need water for breeding, but access to water makes the act of maturing easier for these large awkward birds, and secondly, the exercise gained from swimming improves their fertility.

Reprinted by permission from the American Poultry Journal,
Chicago, Illinois, February, 1949

Just as pasturing dairy cattle, the best system of pasture management consists in fencing and rotating several fields to provide continuous supply of tender forage.

There are only 8 varieties of geese listed in the Standard of Perfection. These are the Toulouse, Embden, African, Chinese, Canada, Sebastopol, Egyptian and Pilgrim geese. Of these, the only ones of any commercial importance are the Toulouse and Embden. They are the largest of the geese. Standard weights of the Toulouse are: adult gander 26 lbs; young gander and adult goose 20 lbs; and young goose 16 lbs; This bird has dark grey feathers on its back which shade off to white on its abdomen. The plumage is loose which gives it a very large appearance.

The Embden is smaller than the Toulouse. Standard weights are: adult gander 20 lbs.; young gander and adult goose 18 lbs.; and young goose 16 lbs. This breed has compact white feathers which give it a more pleasing appearance than the Toulouse. Another advantage is that it has white pinfeathers, making it much easier to dress than the Toulouse, which has dark pinfeathers.

Both breeds are quiet and good dispositioned. They are good feeders and make good gains. The Toulouse lays from 15 to 35 eggs each year, the Embden does not lay so many eggs, but as it is a better sitter and more inclined to lay fertile eggs, the two breeds strike a balance as far as egg production is concerned.

Little work is required to manage a flock of geese. The birds like company and do best kept in undisturbed flocks. Although they dislike confinement, they are not inclined to stray away. If they are provided sufficient pasture, a fence 2 or 3 ft. high is enough to keep them in. Not only is fencing economical, but housing is also inexpensive. Geese need only enough shelter to protect them from the sun in summer and wind and snow in winter. However, when a special goose house is built, it should allow about 10-15 sq. ft. of floor space per bird and be high enough to let them walk erect.

Matings should be made of birds at least 3 years of age for best results. The birds mate for life, once mated they may all be allowed to run together in the same flock. One gander is sometimes mated with 2 or 3 females but best results are obtained with about one goose per gander. It is very difficult to determine the sex of geese. Usually the male is larger and more masculine looking than the goose. In addition, it has a more highly pitched cry than the female. Although geese are able to gain a good living from pasture

alone, it is best to feed the breeding stock a supplement consisting of a mash or both grain and mash in the proportion of 2 parts mash to one of grain. This feeding should be started about 2 months before eggs are desired.

Goose eggs require about 30-32 days to hatch. If hatched in an incubator, they require the same temperature as chicken eggs but the humidity must be higher. The eggs may also be hatched by the goose or by the hen. If the latter method is used, the birds should be treated with a pinch of some good louse powder to repel lice. Allow about 10-12 eggs per goose or 4-6 eggs per hen. If a hen is set on the eggs, they should be turned by hand once daily because they are too large for the hen to turn. As the moisture requirement of goose eggs is high, they should be sprinkled with warm water every day after the first 2 weeks.

After the goslings hatch, they should not be fed for the first 24-36 hours. The feed for the first few days may be stale bread soaked in milk to which some finely chopped green feed has been added. After several days, they are shifted to a good chick starter mash also containing finely chopped green feed. Feed all they will clean up in 15 minutes 3 times daily. After the first 2 to 3 weeks, goslings can get their entire living from good quality pasture.

Rape, rye, and oats make very good spring and fall pasture for geese. If pasture is not too good, the birds should be fed cut greens and vegetables such as clover, alfalfa, cabbage, beets, turnips, etc. During winter, they will do well when fed alfalfa, clover or mixed hay, and silage with occasional small amounts of oats. Like chickens, geese need access to grit and limestone and a constant supply of drinking water. If it is desirable to fatten geese for market in the fall, they are fed mash twice daily plus a light feeding of grain consisting of 3 parts of corn and 1 part of oats and barley. In addition to grain and mash, fattening geese should be given all of of the succulent feed they will eat.

The prospective goose grower may engage in goose production with any or all of the following objectives: meat production, egg production, sale of breeding stock, or various specialty products such as feathers, skins, pate de foie gras (a paste made from fattened goose livers), and smoked goose breast. A small farm flock will produce sufficient geese for home use as meat birds. A larger flock may be kept with the object of marketing the meat. There is a demand for geese through most of the year, especially near cities with large foreign populations. However, prices for geese are

lower than those commanded by other fowl.

Chief demand for geese comes from June to January, with peak periods, at Thanksgiving and Christmas. In early summer, young geese are marketed weighing 10-12 lbs. at 10 weeks of age.

Egg production does not offer too good possibilities because geese have low rates of production and there is little market demand for them. However, the goose egg is a very good table egg and 3 times the size of a hen egg. It is very likely that neighbors observing a successful goose project may wish to keep a flock of their own, thus offering a profitable means of disposing of eggs and excess stock. In addition to the above mentioned possibilities, are the specialties such as feathers, etc. In the past, most of these items have been imported from Europe, but the war and consequent economic upheaval has cut off the supply. Until the goose flocks of Europe are reestablished, the American market stands open to the American farmer.

These specialty projects require so much hand labor that it is only in unusual circumstances that they will be profitable, but on the other hand, there is no doubt that the goose has a definite place on the average American farm, especially those with land which is too wet and marshy for any other purpose. Under any circumstance, they require such slight outlay of of time, money, food, and shelter that they are almost certain to return a profit when kept on a limited scale.

Revive Your Rusty Tools

Don't throw away that saw you left out in the rain. A rag, some kerosene and a little elbow grease can make it as good as new—well, almost. Carl F. Albrecht, agricultural engineer, Michigan State College, says that many tools can be put back in shape by rubbing the coating of rust off with a rag soaked in kerosene or light oil.

If the tools are rusted badly Albrecht advises starting with a mild abrasive such as pumice stone and oil. If this doesn't work use a 240-grit emery cloth and oil. Finish with the pumice to give the tool a smooth, shiny finish.

Prevention is still easier than the cure. Wipe tools occasionally with a rag soaked in oil and keep them away from salt, alkalies or acids.

—Capper's Farmer

Potatoes: Yesterday and Today

Condensed from the Rural New Yorker

John C. Campbell and William H. Martin

THE history of the Irish potato is a story of adventure, conquest and famine as well as of research. There is general agreement that the parent stock of our present white or Irish potato had its origin in the mountainous areas of the northwestern part of South America, particularly in the Andean plateaus of Chile, Peru, Bolivia and Ecuador. Many wild species of potatoes are still found there. The first Spanish adventurers in South America relate the discovery of certain underground vegetables known as "papas" which were grown extensively by the natives. One of the earliest references in literature to the potato is found in Cieca's "Chronicles of Peru," published in Seville, Spain, in 1553. Cieca was one of a group of Spaniards who in 1533 sailed to the New World's southern continent.

These early explorers were seeking gold and silver, but their introduction of the potato to Europe proved to be a much greater treasure than all the gold and silver in the famous Inca temples. The potato was probably carried to Southern Europe about the middle of the sixteenth century, since there is no reference to it by European botanists until 1596 when Bauhin described a plant growing in Spain which was undoubtedly the potato. Clusius in 1601 reported potatoes as being grown in Spain, Italy, and Germany, but they were not widely known in Europe until the latter part of the seventeenth century and did not become of commercial importance until the latter half of the eighteenth century. The Irish secured the potato from England. It was found to have such high food value that eventually most of the inhabitants of the Emerald Isle grew potatoes in varying quantities, later using it as their diets' mainstay. In the years 1845-46 late blight destroyed a large percentage of Ireland's important crop of potatoes. Due to the resultant famine, thousands of the inhabitants were reported to have died of starvation; many more thousands migrated to America to escape starvation.

In the United States, the potato did not become an important food

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until early in the nineteenth century. It was soon found that the varieties commonly grown here were unsatisfactory in many respects. During the period 1859-90 various botanists as well as amateur plant lovers devoted considerable time to the breeding of improved potato varieties. Goodrich, Breese and others working in New England, developed several varieties including Garnet Chili, Early Rose and Green Mountain. The last mentioned is still one of the best potatoes grown today. Most of these early sorts were highly susceptible to disease and were of poor table quality. Both seedsmen and growers paid fabulous prices for a few tubers of some of the first introductions of better quality. It is reported that at one time 150 bushels of Early Rose sold for $80 per bushel and a single tuber of another variety sold for $50.

After a few fairly reliable varieties had become established, the demand for new ones dwindled, so that only a few were introduced between 1890 and 1930 when the U.S.D.A. became concerned with the problem of breeding better quality potatoes with high disease resistance. Since 1932, research workers not only at Beltsville, Maryland, but in many other States as well, have developed and named more than 35 varieties. As an indication that these late introductions have been well received, the Katahdin, introduced in 1932, is now planted widely throughout the United States and Canada as well as in many foreign countries. Other popular varieties include Chippewa, Sebago, Hauma, Sequoia, Warba, Teton Irish Cobbler and Mohawk.

The most recently introduced variety, the Kennebec, was developed by Dr. F. J. Stevenson, senior geneticist of the U. S. D. A., and his associates at Beltsville and Presque Isle, Maine. The Kennebec combines high quality and high yield with strong resistance to the late blight disease. Most of its seed is under the control of the Maine State Seed Board. This Board operates a large farm where both new and old desirable varieties are grown under the strict supervision of trained scientists who rogue out all diseased plants and maintain a stock of the highest quality seed that is humanly possible, known as foundation seed. In the Spring of 1949 foundation seed of the new Kennebec potato will be released to foundation growers in Maine who will plant it in segregated seed plots. The progeny of this seed will then be grown for certification the following year. By the Fall of 1950 there should be a fair supply of certified Kennebec seed available to growers throughout the country.

Years ago potato growers used part of the potatoes they grew for seed purposes the following season. Some growers selected their best looking tubers for this purpose, while others made no effort at selection. This practice naturally resulted in the rapid development of diseases; consequently, relatively low yields were produced. This tendency for the progeny of a potato to produce lower and lower yields was termed "running out," until the trouble was recognized and found to be caused by one or more of the virus diseases.

Shortly before 1920 several States set up official inspection services for seed potato certification. Through this service seed growers usually have their potatoes inspected twice in the field, and twice after harvest, by persons trained to diagnose potato diseases. All seed potatoes, meeting the standards adopted by the various State agencies, may be sold as certified seed; containers used for packaging these potatoes may be identified by an official tag. Certified seed has done much toward keeping our potato varieties true to type and practically free from virus and many other diseases. Many certified seed growers, however, are not content even with this high quality seed and demand foundation seed stock. This foundation seed has to meet still higher standards regarding freedom from disease and must be grown under certain prescribed conditions. Foundation seed is usually planted in tuber-units. This is done by planting all the pieces of a potato tuber in consecutive hills. Most growers plant these potatoes by hand although machines have been developed which do the job fairly accurately. Potatoes are planted in this manner in order to make it easier to remove all diseased plants from the field. If one diseased plant is found, both it and all the other plants growing from parts of the same tuber are removed, even though some may not show any disease symptoms. This practice keeps diseases at a minimum. Many of the more progressive seed growers have their own foundation seed plots in which they grow most of their parent seed stock.

Several States require growers to submit samples of all seed grown for certification to the certifying agencies. These samples are then grown in some of the Southern States during the Winter and inspected for the presence of virus diseases. Any sample that shows more disease than is allowed under the regulation is not eligible for sale as certified seed. In other States growers submit samples of their seed for testing voluntarily for their own information. The

use of certified seed has become so widely accepted by potato growers that, in 1947, 44,284,618 bushels of potatoes were certified by various official state agencies.

The development of the practice of having seed potatoes certified has been partly responsible for a considerable increase in the average yield of potatoes throughout the country. The great reduction in the amount of disease present in seed stocks, which certifying agencies have brought about, has been little short of phenomenal. Ten to 15 years ago it was a common thing to find as many as 25 to 50 percent of the plants in commercial potato fields infected with one of several virus diseases which greatly reduced the vigor of the plants, and likewise the size and quality of the tubers produced. Many examples of increased yields from the use of certified seed have been noted by scientists and growers alike. Between 1930 and 1940 certified and non-certified seed of various varieties have been tested many times; certified seed consistently produced from 20 to 25 bushels more per acre than did the non-certified seed. In some instances the increase amounted to more than 100 bushels per acre.

Insecticides and fungicides developed during and since the war have swept the country like wildfire. The use of DDT has resulted in such good control of aphids, leafhoppers, flea beetles and Colorado potato beetles, that yields have been greatly increased wherever any of these insects have been a problem. Other insecticides such as DDT, Parathion and Chlordan also give considerable promise for the control of potato foliage feeding insects. Several of the recently developed fungicides have not only given fairly good control of late blight and early blight, but have resulted in higher yields than with use of Bordeaux, which has been the standard control for these diseases for many decades. Among these fungicides are the basic copper compounds—Tribasic-CO-CS Copper A, and the organic compounds—Dithane, Parzate, Z 78, Zerlate, and copper zinc chromate. Zerlate controls early blight only but has also resulted in relatively high yields where late blight was not severe.

The use of increased quantities and proper placement of fertilizer, which in many instances include one or more of the minor elements such as magnesium and boron, has also resulted in increased yields. In 1948 the use of magnesium, in a fertilizer on potatoes, increased yields in experimental plots in New Jersey from 20 to more than 100 bushels per acre, depending upon the need for magnesium in the respective soils. Cultural prac-

tices, especially cultivation, have also changed in recent years. Not many years ago it was the common practice to cultivate potatoes from six to 10 times. This procedure not only pruned off many roots and tuber-bearing stolons, but also robbed the soil of needed soil moisture in dry seasons. The use of a weeder has now taken the place of several of the cultivations, with a resultant decrease in root damage and moisture losses.

All these developments have made it possible for the potato growers of the country to produce a crop one-fifth larger than the prewar average on an acreage only three-fourths the size of the prewar acreage. There are a number of States now producing an average yield of 200 or more bushels to the acre, as compared with less than 100 bushels 10 to 15 years ago.

Do Your Livestock Have "Hidden Starvation"?

Although your livestock may appear to be well-fed, they may be suffering from "border-line starvation." So says the American Veterinary Medicine Association.

This "hidden starvation" is caused by the lack of important elements. Here are some:

1. Lack of Vitamin A; common among cattle kept in barns or corrals without pasture or good hay.

2. Not enough protein—when livestock don't get enough supplement.

3. Calcium, phosphorus, and cobalt deficiencies from lack of minerals.

4. Insufficient iodine in the Great Lakes region and in Northwest United States. (A lot of young livestock die every year because they don't get enough iodine.)

—Farm Journal

Methods of Applying Fertilizer

Condensed from Fertilizer Review

EVERY farmer wants to do his work in the most efficient and economical way. When it comes to applying fertilizers, how can this be done best? Broadcast? As side dressing? Under the seed? In the row? Or in what other ways?

For more than 20 years the National Joint Committee on Fertilizer Application has been developing, through cooperative research, the best methods for fertilizer application. It is composed of these organizations: The American Society of Agricultural Engineers, The American Society of Agronomy, The American Society for Horticultural Science, The Farm Equipment Institute, The National Canners Association, and the National Fertilizer Association.

In presenting its recommendations the Committee also outlines certain principles involved in proper fertilizer use. The character of the soil, the crop and the fertilizer materials are among those factors which influence the choice of methods of application of fertilizer to soils.

The principal recommendations made by the Committee for individual crops follow:

Field Crops

Alfalfa

For Establishment: The preferred method is to drill the fertilizer, particularly the phosphate, into the soil at a depth of three or more inches through a grain drill attachment or similar equipment prior to or at the time of seeding the alfalfa. Where heavy applications are made, broadcasting of about half of the fertilizer before plowing has been used with considerable success, particularly on heavy or stony soil where the drill frequently fails to place the fertilizer uniformly as deep as desired.

For Maintenance: When alfalfa stands are maintained for more than two years, application of phosphate and potash in early fall, late winter or early spring as a top dressing, which may be accomplished with grain drill equipment, is generally regarded as desirable and profitable.

Annual and Biennial Forage Crops

For short-lived forage crops, either all or a major portion of

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the fertilizer of ordinary amounts should be drilled to a depth of 3 to 4 inches at the time the stand is established.

Corn

In the North: Fertilizer in relatively small amounts of less than 300 pounds per acre when applied for direct use of check-planted corn may be placed in a short band at each side of the hill with split-boot depositors on conventional corn planters. Fertilizer may also be similarly placed with respect to the seed of drilled corn except that the fertilizer should be drilled uniformly in continuous bands. Fertilizer at rates of application as high as 500 to 600 pounds per acre may be drilled in a continuous band approximately 2 inches to one side of the row in a depth zone about 2 inches below the level of the seed.

Plow-under fertilization should be used to supplement rather than replace the well-established practice of hill or row fertilization.

When unusually heavy rates of application are intended for direct use of the corn crop, a part of the fertilizer should be localized at the hill or near the row as earlier described, and the remainder should be broadcast before plowing the land, banded on the bottom of each plow furrow, placed in a single band near the row at a depth of 4 to 6 inches, or otherwise applied in a similar deep position.

If yellowing of leaves indicates nitrogen deficiency, the crop should be side-dressed with nitrogen 2 to 4 inches deep during cultivation. Excessive injury to the roots by the furrow opener or shovel must be avoided.

In the South: The minerals, including a part of the nitrogen, should be drilled uniformly in continuous bands 2 to 3 inches to either one or both sides of the seed and 1 to 2 inches below the level of the seed. Additional nitrogen should be applied as a side dressing when the corn is about knee-high or 5 to 8 weeks after planting.

Cotton

Complete fertilizer applied simultaneously with planting of the seed should be placed in narrow bands approximately 2½ inches to either one or both sides of the seed row and 2 to 2½ inches below the level of the seed.

Field Beans

The fertilizer in amounts as great as 300 to 400 pounds per acre should be placed in a single band approximately 1 inch to one side of the seed and 1½ inches below seed level.

Pastures

For Establishment: The fertilizer should be drilled in deeply with a grain drill or similar

equipment either before or at the time of seeding.

For Maintenance: The fertilizer should be applied with a grain drill or as a broadcast top dressing in either fall or spring. Pastures in the South that are used for winter grazing should be fertilized in late summer or early fall.

Peanuts

Peanuts generally are best fertilized by supplying sufficient amounts of fertilizer to the preceding cash or cover crop to insure adequate residual fertility.

Fertilizer applied for direct use of the peanut crop should be placed in a band 2 to 3 inches to each side of the row and 2 inches below seed level.

Small Grains

The fertilizer and the seed should be drilled simultaneously with the grain drill, which places the fertilizer close to and in partial contact with the seed.

For fall-planted grain in the warmer areas all of the phosphate and potash should be applied with the grain drill attachment at time of seeding but at least a part of the nitrogen should be withheld for top dressing in the spring.

Soybeans

Soybeans respond well to fertilization of preceding crops; so phosphate and potash should be applied earlier in the rotation in such amounts that adequate residual fertility will still be available for the soybeans.

When soybeans are planted on soils deficient in available nutrients, the fertilizer for direct use of the crop should be applied in one of the following ways: For amounts of 300 to 500 pounds per acre, either the fertilizer should be broadcast and plowed under when the land is being prepared or it should be placed in a band 2½ inches to each side of the row and 2 inches below seed level during the planting operation. For amounts of 100 to 300 pounds per acre, the fertilizer should be applied through the usual split-boot depositor on corn planters or with similar equipment which places the fertilizer in a band approximately one inch to each side of the seed.

Sugar Beets

Fertilizer applied at seeding time should be placed in a band at one side of the row not more than 1½ inches to the side of the seed and at a depth of 1 to 2 inches below seed level. Side dressing with nitrogen at thinning time is recommended in the West.

Tobacco

Fertilizer in amounts as high as 1,000 pounds per acre should be placed in a band 3 to 4 inches to each side of the row and 1 to

1½ inches below the root crown of the transplant. Where the total rate does not exceed 1,500 pounds per acre, the remainder may be applied as a side dressing. When acre quantities are greater than 1,500 pounds, the fertilizer in excess of the row application may be either broadcast and worked into the soil before the plants are set or applied early and plowed under.

Vegetable Crops

Beans, Snap Beans

The fertilizer in amounts as high as 500 to 700 pounds per acre should be applied in bands 2 to 3 inches to the side and 1 to 2 inches below the level of the seed. Where larger amounts are needed the additional fertilizer may be broadcast and plowed under when the land is being prepared or, under some conditions, it may be applied as side dressing.

Lima Beans

The fertilizer should be placed in bands 2 to 3 inches to the side and 1 to 2 inches below the level of the seed. When the rate exceeds 500 pounds per acre broadcasting and plowing under the additional quantity is recommended in some areas.

Cabbage, Broccoli, Brussels Sprouts and Cauliflower

With heavy applications of a high-analysis fertilizer approximately two-thirds should be broadcast and plowed under on the heavier soils or broadcast and harrowed in after plowing on the lighter soils. The remainder should be placed in bands 2 to 2½ inches to each side of the row approximately 3 inches deep at planting time. When comparatively light applications of fertilizer are made the most efficient method of application is in side bands at planting time. Under some conditions supplemental nitrogen is applied as side dressing.

Celery

One-half to two-thirds of the fertilizer is usually broadcast and plowed under, or broadcast and disked deeply into the soil after plowing. The remainder may be placed in a band at each side of the row at time of setting the plants or applied as one or more side dressings in bands along the row.

Cantaloupes, Cucumbers, Melons, Squash and Pumpkins

The fertilizer should be placed in a band 2 to 3 inches to each side of the row and approximately 2 inches deeper than the seed. Generally quantities used in bands should not exceed 500 to 600 pounds per acre. In areas where larger quantities are required, the amount in excess of the normal row application may be broadcast and plowed under

or applied with grain drill equipment. When supplemental nitrogen or nitrogen-potash mixture is needed, it should be applied carefully in the middles as a side dressing not in excess of 200 pounds per acre per application. Contact with the plant should be avoided.

Kale and Salad Greens

The fertilizer should be placed in bands 2 to 4 inches to each side and 2 to 3 inches below the seed level. Plowing under fertilizer is recommended for kale in some areas.

Lettuce

A part of the fertilizer should be broadcast and either disked in or plowed under and the remainder side-placed in bands or applied later as a side dressing. Under conditions such as those in Arizona and California all fertilizer should be applied in bands approximately 4 inches deep and 2 from the plant row.

Onions

On muck, the fertilizer should be placed 2 inches directly under the seed.

Peas

For peas grown in rows 6 to 8 inches apart and receiving from 100 to 600 pounds of fertilizer per acre: The fertilizer should be applied in a band ½ to 1½ inches to one side of the row and one inch below seed level.

The next best method is to drill the fertilizer in deeply with the attachment on a fertilizer-grain drill or similar equipment in a separate operation before planting the seed.

Potatoes

The fertilizer that is applied at planting time should be placed in a band 2 inches to each side of the seed pieces on a level slightly below the bottom of the seed pieces. The two bands will therefore be about 6 inches apart. Additional amounts of fertilizer, beyond those applied in the row at planting time, should be either broadcast and plowed under, applied on the plow sole during the plowing operation, or drilled in after plowing to a depth of 5 or more inches below the surface of the soil.

Root Crops

Placing the fertilizer in bands 1 to 2 inches to the side and 2 to 3 inches deeper than the seed is preferred for row applications. Other methods of application recommended include broadcasting the fertilizer and plowing it under, and broadcasting and working it into the soil. Fertilizer should not be permitted to come into contact with the seed.

Spinach

The fertilizer should be applied

in bands approximately 2 inches to the side and 2 to 3 inches deeper than the seed. Supplemental nitrogen, where needed, should be applied as a side dressing.

Sweet Corn

Best results from fertilization of sweet corn are generally obtained from fertilizer placed in continuous bands 1½ to 2 inches to the side of and slightly below the level of the seed. Row fertilizer may be hill-dropped with the split-boot depositor on the usual corn planter which side-places it ½ to 1 inch from the seed, but to guard against injury with this hill placement the rate should not exceed 300 pounds per acre.

In areas where side dressings are effective one or two side dressings of nitrogen-potash mixtures, in addition to the hill or row application, have been found to be profitable.

Sweet Potatoes

When the total application does not exceed 400 to 700 pounds per acre the most efficient method is to apply all of the fertilizer in bands, 3 inches to the side for the lower amounts and 5 inches to the side for the higher amounts, at a depth of 3 inches. The fertilizer should be accurately placed with proper equipment on the transplanter to avoid plant injury.

When 1,500 to 2,000 pounds of fertilizer are used one-half may be plowed under, drilled deeply with a disk type grain drill before transplanting, or side-placed 5 inches from the row with equipment on the transplanter. The remainder should be applied as a side dressing in bands 5 to 6 inches to the side of the row at a depth of 2 to 3 inches 2 to 3 weeks after the plants are set.

Tomatoes

On Heavy Soils: The fertilizer in amounts of 300 to 500 pounds per acre should be placed in a band 3 to 4 inches to each side of the row and 4 inches below the soil surface, either at the time the plants are set or at first cultivation. For rates heavier than 500 pounds per acre the balance of the fertilizer should be broadcast and plowed under when the land is being prepared. A starter solution should be used.

On Sandy Soils: A portion of the fertilizer should be applied broadcast and plowed under, and the remainder should be divided into two or three applications of 200 to 300 pounds per acre each —the first to be side-placed at time of setting the plants, and the second and third to be applied as side dressing during cultivation in furrows along the row at intervals of 3 to 5 weeks. A starter solution should be used.

Fruits and Nuts

Citrus

In California and Arizona: Nitrogen fertilizer may be applied to citrus in irrigation water with economy in labor and with opportunity of applying small amounts frequently during the irrigation season.

In Florida: The fertilizer should be distributed evenly over all of the soil from trunk to trunk of the trees.

In Texas: The same method recommended for Florida is used to some extent, but some supplementary problems with regard to the high-lime soils make it advisable under certain conditions to use other methods.

Deciduous Fruits Trees and Small Fruits: Annual feeding of the tree with quickly available mineral constituents applied to the major root area at a specific time is designed to directly influence new growth and fruitfulness. Over-all application to the orchard area is also needed to increase the growth of orchard cover crops with their resultant good long-time effects on the general fertility level, organic matter, soil erosion and water conservation. Quickly available nitrogen and other needed nutrients are usually applied to the tree-root area as surface applications by hand or machine.

A New Motion Picture

The National Fertilizer Association has just completed the production of a new sound and color motion picture. Entitled "What's in the Bag," and requiring 18 minutes' running time, the movie tells the story of what is in the fertilizer bag and how it gets there. The picture is available for loan without charge to agriculture workers and NFA members.

Reprints of the article, "Our Soils, Our Food and Ourselves" by William A. Albrecht, which appeared in the April 1949 issue, can be obtained with pictures, maps and graphs for 15¢ each or 12¢ each in quantities of ten or more from THE MENNONITE COMMUNITY, Scottdale, Pennsylvania.

Storing Orchard Chemicals

Condensed from the American Fruit Grower

Ray Hutson
Michigan State College

A LASTING impression made upon me after visiting hundreds of orchards over a period of years is that few growers or dealers give more than casual thought to the storage of spray chemicals. Two hundred "tombstones" formed when a roof leaked upon bags of copper sulfate intended for "instant Bordeaux"! A grower's cherry crop ruined because a drum of oil-dinitro was among the lime-sulfur drums! A peach orchard defoliated by zinc sulfate without lime! These are a few 1948 examples of disastrous results from neglect to properly store orchard chemicals.

Aside from these easily understood examples, there are a number of other angles to this matter of proper handling of pesticides. Contamination, disposal of poisonous spray chemicals no longer wanted, probability of decomposition on long storage, possible salvage values, and fire hazards are some of the things that need consideration.

Contamination is a matter the manufacturer carefully guards against. Shipping chemicals in sealed containers materially increases costs but manufacturers realize that is the only way they can protect themselves. Once a container is broken, anything can happen. Contamination by other materials stored nearby or handled with or near a broken package may occur. Actual mixing need not take place. Spilled lime-sulfur near broken packages of lead arsenate will cause lead arsenate to darken because the "rotten egg" odor associated with lime-sulfur is hydrogen sulfide. Hydrogen sulfide combined with the lead forms a black chemical compound, freeing soluble arsenic.

Contamination from gases generated by fire among chemicals is possible also. However, probably the greatest possibility of contamination of spray chemicals results from careless handling while mixing. Mixing foliage DN sprays in buckets incrusted with lime or in sprayer tanks in which lime residues remain is responsible for many failures with this material. About 10 years ago every spray expert in Michigan and Ohio as well as some from other

Reprinted by permission from the American Fruit Grower, Cleveland, Ohio, February, 1949

States tried to determine why a certain block of Jonathan apple trees suffered severe defoliation. When the puzzle unraveled, sodium chlorate insufficiently soaked out of the staves of a wooden spray tank was responsible. This last instance should indicate that it takes just a little contamination to do a lot of harm.

Pesticide chemicals in storage in most cases undergo physical rather than chemical change. Breaking of oil emulsions; sludging of lime-sulfur; lumpiness in lead arsenate, copper sulfate, and zinc sulfate are common examples of this sort of change. Nicotine sulfate 40 per cent is a most stable chemical. But nicotine sulfate 40 per cent forgotten for years in open containers has repeatedly shown more than 40 per cent nicotine upon analysis.

Constant storage at 75° F. or higher breaks many oil emulsions. Some of the earlier oil emulsions were broken by freezing temperatures. Lime-sulfur sludges when frozen, with loss of strength. Moist air increases lumpiness in powdered pesticide materials. Not a great deal is known about storage of the newer pesticides. Indications are that most of the accepted ones store well in sealed containers.

Lime is the spray material which most often undergoes chemical change in storage. This may be due in part to the casual handling usually given this cheap and readily available material. In any case, spray lime, or calcium hydroxide readily absorbs carbon dioxide when exposed to the air, thus becoming "air-slaked" lime, or calcium carbonate, which is useless for spraying. Finely ground limestone will do as much good in the spray tank as the average spraying lime. The only way to be reasonably sure of good results with sprays containing lime is to buy fresh lime frequently from a reliable dealer.

Temperature is an important factor in the storage of spray materials. In the first place, some of the botanicals (pyrethrum, rotenone, nicotine dusts) lose their potency more quickly at high than at low temperatures. The full story of the effect of temperature in the storage of the newer synthetic organic materials is yet to be learned. We know, of course, that early experience with DDT in oil subjected to low temperatures resulted in the adoption of auxiliary solvents. The matter of "breakage" in oil emulsions and "sludging" in lime-sulfur concentrations is reasonably well known. Aside from actual wetness, moisture effect is less specific. Moisture wrecks containers. Moisture causes lumpiness and poor physical condition of many dry spray materials.

Many spray materials are inflammable. Oil and sulfur are

known to everyone as being readily combustible. Oil seepage and oily rags are well-known causes of fires of "unknown" origin. Sodium chlorate weed killer is highly combustible. Any sulfur-containing spray material, and perhaps other organic spray materials, may also be combustible. Try to tell Texas City, Texas, that ammonium nitrate will not explode! The case of the Clermont County, Ohio, grower whose spray shed ignited from empty sulfur containers may have been an isolated instance; but "one never needs fire insurance until the barn is burning." In other words, no one knows what some mixtures will do even though information on pure chemicals is reasonably complete.

Another angle to the question of fire hazards in the storage of spray materials is the matter of gases driven off by such fires. "Firemen were hampered by chemical fumes," is a frequent observation in news accounts. The gases from the burning of the spray storage on an average fruit farm would defy an analytical chemist! The following quotation from the Arkansas State Plant Board News brings the matter up-to-date: "2,4-D acid in smoke from the recent Clarke Hybrid Corn Company's fire at Conrad, Iowa, was carried by a heavy wind over an alfalfa field which joined the plant area. About two acres of alfalfa were killed."

Spraying programs change. Seasons are different. Crops change. Machinery changes. For any one of these and many other reasons it sometimes becomes necessary to decide what to do with unwanted spray materials. Disposal of such materials is not always easy. Sometimes it is possible to sell or trade usable, unwanted materials. Lead arsenate, sulfur, copper sulfate, zinc sulfate, lime, are all examples of materials which can be used on soil in one way or another. When economic poisons are normally used they are spread thinly enough to render them relatively safe. Find some safe use for unwanted spray chemicals whenever possible.

Burning unwanted spray chemicals for which a use cannot be found does not work well. Aside from the fact that many do not burn, there is the possibility of damage to surroundings from the gases generated. There is, too, in many cases, the matter of poisonous ashes. Take these unwanted spray materials and containers to a disposal area. Make sure the poisonous materials are handled so neither they nor their residues will be disturbed in the foreseeable future. Deep burial is the safest way. A well-managed city dump is sometimes available. In any case, think! It is the only way to avoid possible regret when dealing with many of these left-over materials. Remember—practically all pesticides are poisonous.

From these observed facts and supporting knowledge, it may appear that safe, proper spray material shortage is complex. Proper storage of spray materials reasonably free from the difficulties listed can be reduced to a straight forward routine. The suggestions here presented will take care of a large percentage of the difficulties, if followed:

1. Store spray materials in a well-ventilated, dry place that will not be too hot in summer nor too cold in winter. Some materials break down if too hot, others if too cold. Take special precautions with such materials. Dry means dry. Make it convenient to use the materials by providing shelving racks or sufficient floor space.

2. Know what the labels say. Federal and State labeling laws are specific and are well observed on all standard materials. If for any reason you repackage or a label is lost, you owe it to yourself to label your package explicitly and legibly. In case the old eyes aren't what they used to be, get a reading glass or have someone read the label to you.

3. If you observe suggestion No. 2, you need not depend on your memory, your eyes, or your nose to identify spray chemicals. They are unreliable for identifying chemicals.

Furthermore, there are not many on-the-spot tests that can be applied. Lime-sulfur can be tested with a hydrometer if you have a chart for translating the readings into strengths. Lumpiness in dry materials is revealed by trying to make a thin slurry (batter) with water. If free oil appears on the surface when emulsions are diluted, better check. This observation does not apply to "ready mixes." It is a good idea to check in all cases of this kind with your supplier or your county agricultural agent.

4. Keep the fire, contamination, decomposition, and other hazards in mind all the time.

5. "Muck out" the spray storage periodically and dispose of unneeded chemicals, used containers, and junk. Cleanliness and order will pay off by permitting better timing of your operations because you can readily tell what and how much spray material you have available.

Wax Boosts Fruit Size

Spraying trees with wax just before ripening begins may increase size and improve quality of fruit. This cuts down amount of moisture lost thru leaves. Coated Bartlett pear trees at Michigan yielded 10 to 16 per cent more fruits 2¼ inches or more in diameter. The wax at a concentration of 1 per cent apparently increased cherries 7½ per cent to 24 per cent. Kiefer pears and apples did not respond. —*Capper's Farmer*

Permanent Pastures in South Carolina

Condensed from Better Crops with Plant Food

W. H. Craven
Clemson College, South Carolina

THE permanent pasture program of the Extension Department in South Carolina is planned each year so as to have a uniform pasture demonstration throughout the State. Eighty-seven such demonstrations have been conducted by farmers through the aid of the Extension Service from 1945 through 1947.

The results of these demonstrations clearly show that pastures have a greater animal unit-carrying capacity when a complete fertilizer is applied. The average animal unit-carrying capacity on pastures that received a complete fertilizer was 1.6 per acre.

Once a good legume sod has been established and not overgrazed, the nitrogen requirement becomes of less importance. The phosphorus, potash, and calcium requirements for optimum legume and grass growth must be supplied at least once a year and preferably twice yearly. Best results in South Carolina have been obtained from the application of 500 pounds of a 3-12-12 fertilizer in the early spring and a like amount in September, making a total application of 1,000 pounds of a 3-12-12 per acre yearly. The fall fertilization will take up when the spring application has been exhausted by the grass and legume growth. It must be remembered that plant nutrients are essential for legume growth during the fall months.

During the past few years, farmers in South Carolina have become greatly interested in establishing and maintaining good permanent pastures. It is now a realization on their part that a good permanent pasture does not just happen, but requires adapted soils, good firm seedbed preparation, liberal fertilization including lime and basic slag, proper seeding, and good management. This realization has resulted to a large extent from the lessons taught by these pasture result demonstrations. The adage "seeing is believing" has been clearly illustrated when invariably the livestock will graze the fertilized plots constantly and leave the unfertilized check plots untouched.

These observations have also emphasized the fact that permanent pasture plants require plant nutrients the same as field-grown

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crops. Unfortunately, the total feed taken from an acre of good permanent pasture cannot be measured by observation as can bushels of corn or pounds of cotton per acre. The harvest from the pasture is not made in a single operation, but rather is extended over a period of 6 to 7 months. The plant-food requirements therefore become much greater when the pasture plants are constantly striving to maintain a growth toward maturity while at the same time being grazed off by the livestock.

In addition to these results from the 3-year average of the 87 permanent pasture demonstrations, farmers conducted in 1947 a total of 167 pasture demonstrations, which included 6,945 acres. This acreage furnished an average animal unit-carrying capacity of 1.68 per acre. The average number of days grazed was 209. With this long period of grazing together with supplementary grazing crops, such as our fescues, sudan grass, pearl millet, combination of velvet beans and corn or grain sorghum, annual lespedeza, kudzu, and sericea lespedeza, a year-round grazing system can be had on every farm in South Carolina.

County agents have held a large number of county tours at which farmers from all parts of the State have had an opportunity to observe the effects of a complete fertilizer on these pastures as compared to the untreated plots. The State Pasture Committee also visits a representative number of these demonstrations each year. Many of the present permanent pasture recommendations have been made based on studies of these demonstrations.

Notwithstanding the fact that permanent pastures furnish the cheapest feed on the farm, it must be remembered that there is no compromise for following through with the required steps in establishing a good pasture. Failure to sufficiently inoculate clover seed and to protect the inoculant with a cultipacker when seeding will usually result in failure to obtain a satisfactory stand of clover.

Patience is very necessary in establishing a permanent pasture. Good sods of grasses and legumes require several years. Once the pasture has been established, the job is not done. At this stage the proper maintenance and management begin. Neglected use of the mowing machine to control noxious weeds, overgrazing, undergrazing (although seldom occurring), and in inadequate use of the plant nutrients will not contribute to keeping a pasture of high quality and production.

Specialized Farming

Condensed from The Farmer

Harold Severson

IT ISN'T what you have but what you do with it that counts.

That's the slogan of Art and Ardith Podein of Kenyon, Goodhue County, Minn., who found a gold mine on 20 acres.

The Podeins came to Kenyon 10 years ago from Rochester, Minnesota. Art was born and reared on a farm; Ardith was a city girl, a graduate nurse who knew practically nothing about farming. Today they have a farm on which they raise foxes, mink, rabbits, chinchillas, nutrias, hogs, chickens, raspberries, strawberries, apple trees, shade and ornamental trees, timber and milk cows.

This is only a part-time undertaking for Mr. Podein. He went to Kenyon in 1938 as manager of the implement department of the Kenyon Farmers' Mercantile and Elevator Company, a cooperative concern. He built it up from a two-man concern to one employing 23 workers. Mrs. Podein "ramrods" the farm during his absence but they discuss plans for the next day's program at the evening meal. They have two full-time employees in Olaus Paulson, an experienced nurseryman, and Joel Boraas, who is Podein's partner in the mink and fox department in addition to helping out with the general farm work. In addition, Charles Hilstad, a 4-H member, is a partner in the rabbit enterprise.

Last year the half-acre raspberry patch netted $1,648. A new variety was planted which ripened three to four weeks earlier than standard varieties like the Latham. The Podeins kept grocery stores in Kenyon, Rochester and Faribault well supplied with these berries. Then when their quarter-acre of ever-bearing strawberries came into production, they were able to hit the market at a time when other strawberry growers found themselves without berries.

In addition to the fruit, the sale of raspberry cuttings and strawberry plants, plus rhubarb and asparagus crowns, added to the Podein bank account. An acre of apple trees is carefully kept up through constant pruning, spraying and cultivating. In addition, Mrs. Podein is developing a good business in sale of ornamental and

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shade trees.

Visitors to the Podein place are impressed by its cleanliness despite the 200 rabbits, 50 mink, and 21 foxes. When the Podeins outlined plans for their fur farm three years ago, they agreed it was to be kept sanitary. There was a practical reason for some of their neighbors were only a hundred yards away and the Podeins did not want trouble caused by foul odors and flies from their pens. Once a week in the summer DDT was sprayed all over the kennels. Lime is used generously under the pens. Droppings are removed daily.

At present Podein and Boraas are raising the Norwegian Platinum foxes, Full Silvers and Moon Ridges. Among the mink breeds represented on their farm are the Black Yukon, Silver Blues and Whites. In addition, Podein has four pairs of chinchillas for which he paid from $1,000 to $1,650 a pair.

Shipping rabbits to 21 states, including Florida, the Podeins find them a good source of revenue. All are registered, the culls or off-color rabbits being sold for pet or meat purposes. Also they supply the Mayo Clinic at Rochester with rabbits for experimental purposes. Among the breeds in their pens are Flemish Giants, Chinchillas, Angoras, Black and Blue Checkers and Dutch rabbits. The Chinchilla rabbits are not to be confused with genuine Chinchillas. The latter are tiny, rodent-like animals. Their small and soft pelts are used to make some of the world's most expensive fur garments. It costs very little to feed these little animals. Being vegetarians, their feed consists of vegetables, fruit, grain, and a little hay costing between $2 and $4 yearly.

A flock of Leghorn layers—between 500 and 600 hens each year—are raised from baby chicks. The nine Guernseys are partly registered. Podein breeds them through the Goodhue County Artificial Insemination Society, and at present has 10 calves he is raising as herd replacements. Cream is sold to the nearby North Star Creamery and the separated milk goes to the calves. In addition to these animals, there are seven brood sows. On an average, the Podeins raise about 50 pigs.

Nor is this the end of the story for Mrs. Podein asks—and receives—$35 for each kitten which her two Siamese cats produce each year.

An amazing story? One that very few farm couples can match?

Not at all, assert the Podeins.

"Yes, it does demand work and planning," agrees Art Podein. "But any couple can do the same even on a part-time basis."

INDEX

BEEF CATTLE

Meat on the Lifeline ——— Oct., 1948
Careful Marketing cuts Meat Costs — Oct., 1948
Science helps Livestock ——— Oct., 1948
Unreckoned Profits from Feedlot — Nov., 1948
Blueprint for Beginners ——— Nov., 1948
The Quest for Tenderness in Beef — Dec., 1948
The Common Liver Fluke ——— Dec., 1948
More Beef from Grass and Hay —— Jan., 1949
Shipping Fever ——— Feb., 1949
Steer Feeding Experiment ——— Feb., 1949
Bright Future for Beef Breeding — Feb., 1949
Destroy Those Grubs ——— Mar., 1949
The Beef Steer ——— Mar., 1949

CONSERVATION

Water Whenever You Need It —— July, 1948
New Lease "Rider" ——— Aug.-Sept., 1948
Water Put to Work ——— Aug.-Sept., 1948
So You Have No Erosion ——— Nov., 1948
Birth of a New Farm ——— Nov., 1948
America's New Acres ——— Nov., 1948
Why be a Friend of the Land? —— Jan., 1949
Vermont's Sandblows ——— Jan., 1949
*Is Soil Conservation Worthwhile? — Feb., 1949
A Living Rose Fence ——— Feb., 1949
New Things on Agricultural Lands — Mar., 1949

CROPS

Harvesting Forage Crops —— Aug.-Sept., 1948
A Rotation Worth a Fortune — Aug.-Sept., 1948
Can You Tell When Crops Need Feeding? Aug.-Sept., 1948
Corn Borer Parasites Established — Oct., 1948
Better Protein, More Oil in Corn — Oct., 1948
*Get Corn Rootworms Chemically — Oct., 1948
*Weedless First Cutting of Alfalfa — Oct., 1948
*Turn Atomic Energy on Corn —— Oct., 1948
Birdsfoot Trefoil ——— Dec., 1948
Kentucky's Wonder Grass ——— Dec., 1948
You could have more Corn ——— Dec., 1948
Sudan Grass ——— Dec., 1948
*Are Soys hard on Soil? ——— Dec., 1948
*New Royal Wheat ——— Jan., 1949
Seed Certification ——— Jan., 1949
Hard Seeds in Legumes ——— Jan., 1949
Conditions Affecting Crops ——— Feb., 1949
*Stubble Mulch ——— Feb., 1949
*Wheat ——— Feb., 1949
Right Rotation for Your Farm ——— Mar., 1949
Nitrogen for High-Protein Corn —— Mar., 1949

DAIRY CATTLE

*Save the Colostrum ——— July, 1948
Develop Your Dairy Heifers ——— July, 1948
Dairy Herd Turnover—Is Vitamin D a Factor? July, 1948
Facts in Herd Management ——— July, 1948
Don't Blame the Bull ——— Aug.-Sept., 1948
Dairy Cattle Breeding Experiments, Aug.-Sept., 1948
Dairy Sciences in Great Britain, Aug.-Sept. 1948
Low Cost Production ——— Oct., 1948
Breeding High Testing Cows ——— Nov., 1948
Factors Affecting Fertility ——— Nov., 1948
Aspects of Milk Hygiene ——— Nov., 1948
Milk Production in Pen Barns —— Dec., 1948
Trace, Minerals Nutrition ——— Dec., 1948
Buying a Dairy Cow? ——— Dec., 1948
Why Do Cows Bloat? ——— Jan., 1949
Keeping Old Bulls in Service ——— Jan., 1949
Cooperative Milking Barns ——— Jan., 1949
*Calves Like Old-Fashioned Straw — Mar., 1949
*What Is This Dairy Bull Worth? — Mar., 1949
Proved Sires—What are they? ——— Apr., 1949
Fertilizer licks Breeding Troubles — Apr., 1949
*Cobalt ——— Apr., 1949

FARM ECONOMICS

Farm benefits from a good Lease — Dec., 1948
On the Spot Farm Research ——— Feb., 1949
Planning Committees ——— Feb., 1949
Philosophy of Balanced Farming — Mar., 1949
Farming with a Plan ——— Apr., 1949
Up-to-date Farm Insurance ——— Apr., 1949
How Big is Your Farm? ——— Apr., 1949
British Farmers' 3-yr Plan ——— Apr., 1949

FARM BUILDINGS

Farm-Building Management ——— Jan., 1949
A Barn That Saves Labor ——— Feb., 1949
A Fence for the Future ——— Feb., 1949
Dairy Pen Barns? ——— Feb., 1949
Fence Post Magic ——— Apr., 1949
*Less Cleanup at Blower ——— Apr., 1949

FARM MACHINERY

Self-Feed Hay Dryer ——— Jan., 1948
Hay Finishers Prove Their Value — Jan., 1948
What Makes Machinery Wear Out? — Feb., 1948
Silage Comes Tumbling Down —— Feb., 1948
Field Forage Harvester ——— Mar., 1948
Milking Through a Pipe ——— Apr., 1948
Farm Mechanization ——— Dec., 1948
*Cleans Barn every 7 minutes ——— Dec., 1948
Electric Litter Stirrer ——— Feb., 1949
A new way to buy Machinery ——— Apr., 1949

FEEDS

Prime Feed at Low Cost ——— Oct., 1948
Feed those Cobs ——— Dec., 1948
Grow Your Own Feed ——— Mar., 1949
Help in Selecting Feeds ——— Mar., 1949
Stock Feed from Wood ——— Apr., 1949
News that may cut Feeding Costs — Apr., 1949

FERTILIZERS

The Fertilizer Rate Problem — Aug.-Sept., 1947
How to Build Lasting Fertility —— Mar., 1948
Stretch Your Fertilizer Dollar —— Apr., 1948
The Story of Nitrogen Fertilizer —— Oct., 1948
Nitrogen helps Winter Wheat ——— Dec., 1948
*Noncaking Fertilizer ——— Jan., 1949
Buy Lime by Quality ——— Jan., 1949
Are You Wasting Fertilizer? ——— Feb., 1949
Phosphates from Ancient Animals — Feb., 1949
Slags Have Liming Value ——— Mar., 1949
Hardening Plants with Potash —— Mar., 1949
*Sick Soil May Need Boron ——— Mar., 1949
Compost Development in India —— Apr., 1949
Rock Phosphate ——— Apr., 1949

FORESTRY

How to Heat with Wood ——— June, 1948
Fence Posts from Soft Woods ——— June, 1948
Sweet Gum from the Sweetgum —— July, 1948

INDEX

What about Windbreaks ..... Oct., 1948
Spray Stumps at any Time ..... Dec., 1948
Woodland Co-op ..... Feb., 1949
Shade Trees for the Farm Home ..... Mar., 1949

FRUIT

*Low-Acid Peaches ..... May, 1948
Marketing Begins in the Field ..... Aug.-Sept., 1948
New Containers for Peaches ..... Aug.-Sept., 1948
Hormone Sprays ..... Dec., 1948
Orchard Mulch ..... Mar., 1949
*Mulching Saves Orchard Soils ..... Mar., 1949
Planting Good Nursery Stock ..... Apr., 1949

HAY

*Dries Wilted Hay ..... July, 1948
Better Buffalo Grass ..... Nov., 1948

HOGS

Swine Type and Marketing Practices, ... Dec., 1948
Modern Swine Feeding Pays ..... Dec., 1948
Hog Mange ..... Jan., 1949
Livestock Feeding ..... Jan., 1949
Proteins for the Growing Pig ..... Feb., 1949
Care of Unborn Litters is Vital ..... Feb., 1949
*Hog Production Records ..... Feb., 1949
Production Testing Pays ..... Mar., 1949
More Pork an Acre ..... Mar., 1949
*Hog Profits in Rye and Alfalfa ..... Mar., 1949
*Copper Speeds Pig Gains ..... Mar., 1949
Swine Sanitation ..... Apr., 1949
*Stores Sod to Feed Pigs ..... Apr., 1949

HORSES

Group Riding in California ..... Nov., 1947
New Killers for Livestock Pests ..... July, 1948
The Agriculture Remount Service ..... Oct., 1948

INSECTS & INSECTICIDES

Destruction in the Dark ..... Aug.-Sept., 1947
Control of Cattle Parasites ..... Oct., 1948
New Test for Weevils ..... Nov., 1948
Parathion for Greenhouse Pests ..... Nov., 1948
Ohio's First Fly-Free County ..... Dec., 1948
Fly Resistance to DDT ..... Jan., 1949
Where Do New Insecticides Lead? ..... Jan., 1949
Destroy Those Grubs ..... Mar., 1949
Bees on every Farm ..... Apr., 1949

PASTURES

Progress in Pastures ..... June, 1948
Stretch Your Pasture Season ..... June, 1948
Birdsfoot Trefoil ..... Aug.-Sept., 1948
Pasture Renovation Pays ..... Dec., 1948
Path to Profit is Grass Covered ..... Jan., 1949
Profitable Pastures ..... Mar., 1949
*Pitting Makes More Grass ..... Mar., 1949
Pasture Champion of New England ..... Apr., 1949
Green Pastures all Season ..... Apr., 1949

POULTRY

Oxygen Helps Them Hatch ..... July, 1948
Why Does Deep Litter Work? ..... Nov., 1948
What is new in Equipment? ..... Nov., 1948
Chicken-of-Tomorrow Facts ..... Nov., 1948
Estrogen Fattens Turkeys Faster ..... Nov., 1948
Feeding Methods for Pullets ..... Nov., 1948
Baffle Boards Keep Litter Dry ..... Dec., 1948
*Crosses find their Niche ..... Dec., 1948
Breeder Selection ..... Jan., 1949
Why Deep Houses Are Better ..... Jan., 1949
Methods of Packaging Poultry ..... Jan., 1949
More Eggs in Top Grade ..... Jan., 1949
Chick Mortality ..... Feb., 1949
Steaks Sell Turkeys ..... Feb., 1949
So That Fewer Chickens Die ..... Feb., 1949
Electric Litter Stirrer ..... Feb., 1949
Broiler Profits ..... Mar., 1949
What's New in Poultry Nutrition ..... Mar., 1949
It's Cut-up Chicken 20 to 1 ..... Apr., 1949
Advantages of Poultry Pastures ..... Apr., 1949
Does feeding Grain Free-Choice Pay? ..... Apr., 1949

SHEEP AND GOATS

The Way Animals Graze ..... Aug.-Sept., 1948
Your Sheep may need Cobalt ..... Oct., 1948
The Feeding of Milk Goats ..... Oct., 1948
Man's Best Friend in Greece ..... Oct., 1948
Full-Feed for Lambs ..... Nov., 1948
Sheep Research ..... Jan., 1949
"Elastration" ..... Feb., 1949
Lanolin-Ancient Beauty Aid ..... Feb., 1949
Lambing Time ..... Mar., 1949
Salt and Profitable Sheep Raising ..... Apr., 1949

SOILS

*An Agricultural Revolution ..... Dec., 1948
Balance Your Soil Bank Account ..... Jan., 1949
Soil Fertility and Nutrition ..... Feb., 1949
Soil Doctrines ..... Feb., 1949
Soil That Breathes ..... Feb., 1949
Should We Stop Cultivating? ..... Mar., 1949
Legumes Supply Organic Matter ..... Mar., 1949
Physical Structure of Soil ..... Mar., 1949
Our Soils and our Food ..... Apr., 1949

VEGETABLES

Mulching Vegetable Crops ..... Oct., 1948
Hormones for Tomatoes ..... Oct., 1948
*Sweet Potatoes ..... Jan., 1949
*Spacing Tomatoes ..... Apr., 1949
Radio-Active Planting ..... Apr., 1949
*A fine Squash ..... Apr., 1949

WEEDS

Chemical Weed Control ..... June, 1948
Smother Crops ..... July, 1948
Chemical Warfare against Weeds ..... Nov., 1948
Control of Wild Garlic & Onions ..... Apr., 1949
Wealth in a Weed ..... Apr., 1949
Chemical Crabgrass Control ..... Apr., 1949

MISCELLANEOUS

Make Fence Posts Last Longer ..... Jan., 1949
Nutritional Anemia ..... Jan., 1949
Year-Around Stump Treatment ..... Jan., 1949
Up to $5,600 an Ounce ..... Feb., 1949
New Cleaning Materials ..... Feb., 1949
LPG Runs Farm Tractor ..... Feb., 1949
Farmers Under Our Feet ..... Feb., 1949
Is the Bounty System a Farce? ..... Feb., 1949
Rope—Its Uses on the Farm ..... Mar., 1949
Skunk Odor Routs Rats ..... Mar., 1949
Man-Made Weather Miracle ..... Mar., 1949
Vermiculite—Magic Substance ..... Mar., 1949
Kansas Good Will ..... Mar., 1949
Churches That Farm ..... Mar., 1949
Thermometer Stories ..... Apr., 1949
Strong Bones in Old Age ..... Apr., 1949
Research discovers Facts ..... Apr., 1949

* Short Articles.

AMONG THE NEW BOOKS

FRUIT SCIENCE—By Norman F. Childers, Professor and Research Specialist in Horticulture, New Jersey Agricultural Experiment Station, New Brunswick, New Jersey.

Fruit Science is written for all interested in knowing the trends and research developments concerning fruit growing. The text is divided for the convenience of the grower into individual chapters on each of the fruits to save him time when reference is needed. Suggested collateral reading is also listed for extra aid. This book is a "must" for those interested in insect and disease control, pruning, soil management, pollinization, harvesting, judging, freezing preservation, other practises and problems, both in tree and small fruits.

J. B. Lippincott Company — 630 pages — $5.00

LIVING ON A LITTLE LAND—By George P. Deyoe, Professor of Agricultural Education, University of Illinois.

In this book, Dr. Deyoe presents a vast amount of information useful to operators of "small-scale" farms. He emphasizes the importance of careful planning for success in this type of farming, and of the promising possibilities for those who have the necessary "know-how" for Living on a Little Land. Advantages and disadvantages of country living are pointed out, together with helpful and practical suggestions for starting such enterprises as raising vegetables, tree and small fruits, chickens, pork, milk, bees, turkeys and rabbits. Attention is focused on such phases of operation as planning the farm business, the home and farm buildings, improving the soil, keeping records, controlling weeds, storing and marketing surplus production. If you are interested in developing your own country home, you will find this a useful and a very helpful book.

Interstate Printers & Publishers, Inc. — 743 pages — $3.95

EVERYDAY FARM LAWS—By R. L. Adams, Professor of Farm Management, College of Agriculture, University of California, and W. W. Bedford, Attorney-at-Law, Berkeley, California.

This book will give to the farmer or ranch owner, in easy-to-understand language, a grasp of the elementary aspects of law as applied to agriculture, and will help him to gain a better understanding of definitions and terms, principles and procedures of agricultural law as these have been developed through the years. Among the topics considered in Part I are attachments, contracts, crops, insurance, liens, livestock, markets, mortgages, notes, renting, taxation, trespass. Part II is a discussion of State Agricultural Legislation. Many of the questions which confront the farmer in his everyday dealings on and off the farm are discussed in this book.

Interstate Printers & Publishers, Inc. — 272 pages — $2.75

VEGETABLE GROWING—By James Edward Knott, Ph.D., Professor of Truck Crops, University of California. 4th Edition, thoroughly revised with illustrations.

Here is a book designed to stimulate interest in vegetable growing and to acquaint the grower with the current trends in this field. Full consideration is given to such subjects as the preparation of soil, moisture problems and weed control, the maintenance of soil organic matter and fertilization, insect and disease control, also the various cropping systems. Among the crops which are adequately discussed in separate chapters are the greens, cole crops, salad vegetables, the bulb, root, vine and solanaceous crops, as well as beans, peas, potatoes and sweet corn.

Lea & Febiger — 314 pages — $4.00

"The glory of the farmer is that, in the division of labors, it is his part to create. All trade rests at last on his primitive activity."

—*Ralph Waldo Emerson*